The Chemical Age

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Why Do We Manufacture?

WHY do we manufacture? An odd question, but the answer is not so self-evident as it would seem to be. Any maker of chemicals, chemical plant, or of most other commodities would have only one answer to that question and according to his lights and behaviour it would be the right answer. He would intimate that he was not in business for his health, and that his object was to make profit. The answers might show some divergence at that point, for some might say that they desired to make a living for themselves and dividends for the shareholders, other might say that they wished to make the largest possible fortune for themselves, and perhaps yet others would add that they also desired to keep their staff and workmen in employment. Whatever may be the actual terms of the answer, one thought must clearly run through every reply, and that is the desire to make profits. This answer does not necessarily imply even the smallest particle of greed, for without profits no man can exist save on charity in the present organisation of society.

There seems to be a surfeit to-day of papers and addresses dealing with industry from the academic standpoint, and many of these addresses indicate that profit-making as an object of industry is—well, not quite nice. Thus, Professor Hilditch, in his chairman's address to the Liverpool section of the Society of Chemical Industry, used the words: " . . . the view, with which we are so familiar to-day, that service to the community rather than mere profit-making should be the ideal of the manufacturer." " Mere " is good. It would be well that, however altruistic, even socialistic, may be the views of teachers of chemistry, they should instil into their students the fact that now, as for thousands of years past, the ability to make or to influence profits is the sole criterion of the fitness and worth of any man in industry, be he labourer, chemist, or chairman of the board. Costs, finance, efficiency for the purpose of reducing costs or of making a better and therefore more valuable product, are all-important in industry. Those who enter industry will soon learn that ideals are all very well in theory; in practice, what counts is the ability to obtain a share of whatever work is going, to produce better or cheaper goods than others and, generally speaking, to conduct business and manufacturing processes at least as well as one's rivals and competitors.

" I shall probably be not far wrong if I assume that the great majority of manufacturers think mainly of their manufactures as a means of making money. Yet manufacture performs far higher functions, which should not be lost sight of . . . . He (the manufacturer), by his industry, benefits not only himself, but the rest of the world, providing employment for those under him and generally a useful product for his customers." In what year was that written? It might have been 1936; it was, in point of fact, 1887. We have been paying lip-service to ideals for at least 50 years, and we do not doubt that the world has been doing exactly the same since barter began. A similar thought, for example, is met with in a Chinese poet of the 17th century, Cu'en Tzu-agig, who wrote: " Business men boast of their skill and cunning, but in philosophy they are like little children, bragging to each other of successful depredations, they neglect to consider the ultimate fate of the body." Dr. Johnson, always a realist, was more to the point when he attended the sale of Thrale's brewery, declaring that: " We are not here to sell a parcel of boilers and vats, but the possibility of growing rich beyond the dreams of avarice."

Professor Hilditch declares, and rightly, that " fifty years ago, in the good old days, it was still the same story, easy to sell corn, difficult to distribute it and sell it at a remunerative price and yet a greater proportion of the population of England went short of bread than they do to-day."

It is true that in industry we manufacture and we indulge in the most painstaking research for the purpose of making profits. It is true that we judge our employees solely by their value in promoting this end; but it is also true that the real object of industry is to provide people with the goods they want—even if we sometimes have to engage salesmen to induce them to believe that they want our goods. It therefore stands to reason that real and lasting prosperity in industry can only come about through an extension of our customers. In a word, and in brutal fact, this means that if the present relative prosperity is to continue after the rearmament programme has been brought to a conclusion, we must solve the problem of the better distribution of goods.

Our industrial prosperity has been built up by selling our manufactures to a world that did not make for itself; now the world has established its own factories. Our hope lies in the fact that there is still poverty, and unsatisfied poverty is a potential market. Science has not caused unemployment; in the hungry 40's some 2,000,000 out of a total of 11,000,000 were on the streets. Poverty to-day, we have it on the highest authority, is due to failure to apply scientific method to social problems. If the rate of advance has outstripped our capacity to deal with it, ought we not to stop to ask ourselves: How can we modify our distribution system so that the potential markets can be widened?

Notes and Comments

The " Chemical Age " Year Book

IT is our pleasurable duty to acknowledge a large number of appreciative messages which have reached us during the week from recipients of the 1937 edition of THE CHEMICAL AGE Year Book. The production of such a work of daily reference is a task that would be impossible of accomplishment without the co-operation of many friends in the industry, and we take this opportunity of thanking all who have helped us to produce a more complete Year Book than in any previous year. Old features which had become so familiar as not to need repetition have given place to new information compiled and checked to a great extent by the industry itself. " Who's Who in the Chemical Industry " is an entirely new feature, containing details of the official positions held by some 400 members of the industry. An analysis of audited accounts is included this year as an indication of the commercial trends in the industry. With the help of the secretaries of some 125 societies the directory of chemical and allied oganisations has been entirely revised, while the bibliography includes all new books of importance published during 1936. The extended list of chemical and metallurgical journals throws light on the vast field of current literature available for the chemical practitioner, and the pages of proprietary and trade names provide readily accessible information for those in search of specialised products. An increased number of advertisers have availed themselves of the valuable " shop window " represented by the advertisement section. While the 1937 Year Book is still new, we would invite readers to suggest any further improvements which might appropriately be introduced twelve months hence.

The Chemical Council

THE Chemical Council appointed in 1935 under a deed of agreement, to be operative for seven years, between the Chemical Society, the Institute of Chemistry and the Society of Chemical Industry, has issued its first annual report. The Council aims at promoting co-operation between the three societies with a view to effecting economies in administration and in publications, in furthering the science of chemistry for the public good, in extending the publication of new knowledge and abstracts and in the maintenance of the chemical library. For these objects the Council has appealed for financial support, and the report discloses that the contributions promised to date amount to an estimated total of £23,410, of which £8,558 has actually been received. Before issuing its appeal the Council was fortunate in securing a generous promise of £9,000 from Sir Robert Mond. A personal appeal to members of the constituent bodies yielded promises of £5,640. A printed appeal was issued in June to industrial concerns and other organisations likely to recognise the importance of science and the benefits to be derived from the encouragement of research, with the result that the Council has in view promises from this source amounting to £4,148, and it is understood that several important companies have the matter under consideration. On the winding-up of the Association of Scientific and Technical Institutions a further sum of £2,128 was transferred to the funds of the Council. If the ambitions of the Council are to be realised, all the chemical societies must eventually be housed under one roof, and we note with interest that " preliminary consideration has been given to the question of premises." The lease of the Society of Chemical Industry's premises expires shortly, and there is now no available accommodation at Burlington House for the increasing library of the Chemical Society.

Record Nitrogen Production

NEW records in the world's production and consumption of fixed nitrogen are announced in the report of the British Sulphate of Ammonia Federation, a summary of which appears elsewhere in this issue. Production of pure nitrogen reached a total of 2,378,000 metric tons in 1935-36, an increase of 14.9 per cent. over the preceding year, compared with the previous record of 2,113,000 tons achieved in 1928-29. Consumption totalled 2,400,000 tons, an increase of 15.9 per cent. over the previous year's record of 2,071,000 tons. There has been a rapid increase in the use of nitrogen for industrial purposes, influenced, of course, by quite different causes from those, such as the relative prosperity of the farming community, which affect the fertiliser nitrogen consumption. It is recorded that the international agreements mentioned in earlier reports continue to operate satisfactorily and in particular enable the rapid adjustments necessitated by the fluctuations of demand and by the ever increasing complexities of exchange control, quotas and tariffs to be smoothly and equitably effected. That agriculture at home is becoming increasingly " fertiliser conscious " is shown by an increase of 4.9 per cent. in the home consumption of sulphate of ammonia. There is, however, a constant need for propaganda. Speaking generally, the fertiliser season closed on a less optimistic note than it opened, so far as agricultural prospects were concerned.

Oil from Coal

A GLIMPSE of the growing importance of the production of oil from coal was afforded by Colonel W. A. Bristow in his speech at the annual meeting of Low Temperature Carbonisation, Ltd., last week. Formed primarily for the manufacture of solid smokeless fuel, the company has produced, not in the laboratory only but to a total of approximately 180,000 tons, petrol for the Royal Air Force and for motorists generally, fuel oil for the Admiralty and for industrial purposes, Diesel oil for high speed transport and for heavy stationary engines, various oils which are being converted into petrol by hydrogenation, creosote oil, tar acids, solvents and wash oils and chemicals recovered from the oils and liquors. In addition to the original petrol and oil distillation plants the company installed in 1936 a successful Diesel oil and chemical plant, and it is now about to commence the construction of a further plant to cost about £100,000, which it is hoped will be in production by next July. The only difficulty which stands in the way of an immediate large-scale expansion of the industry is in obtaining ample and regular supplies of coal. In this connection the company is determined to press for Government action to remedy the defect in the present coal system.

British Sulphate of Ammonia Federation

Annual Report for 1935-36

ACCORDING to the 16th annual report of the British Sulphate of Ammonia Federation, Ltd., the year 1935-36 was the thirty-ninth year of propaganda work undertaken successively by the Sulphate of Ammonia Committee, the Association, the Federation, Nitram Ltd. and Imperial Chemical Industries Ltd. During the year it is estimated that there was an increase of 308,000 metric tons of nitrogen, or about 14.9 per cent., in the actual production of the forms of nitrogen enumerated in the Federation's report. The production in Chile increased by 13,000 tons, or seven per cent., and output in other countries increased by 295,000 tons, or 16 per cent. The most marked increases in manufactured nitrogen output have been in Germany, Japan, the United States and Russia.

Synthetic nitrogen plants have on an average operated at only about 48 per cent. of capacity during the year: the world production capacity for synthetic nitrogen, including cyanamide, is estimated at 3,700,000 tons of nitrogen.

Increased Consumption

The total consumption increased by 329,516 tons, or about 15.9 per cent., following an increase of 10.3 per cent. last year. The increase in fertiliser nitrogen consumption was 256,000 metric tons, or 14.1 per cent., as compared with 8.3 per cent. in the previous year.

PRODUCTION OF AMMONIA PRODUCTS AND OF AMMONIUM SULPHATE IN THE BRITISH ISLES.

(Tons of 2,240 lbs.)

	Total production of Ammonia Products, expressed as Sulphate of Ammonia equivalent (basis 25 per cent. ammonia)				Included in the Total.
Calendar Year.	England and Wales	Scotland.	Ireland.	Total Great Britain and Ireland.	Industrial Ammonia Products (basis 25 per cent. ammonia)	Sulphate of Ammonia as such) (actual tons of product)
1930	730,508	69,895	3,711(*e*)	804,114	89,000	678,400
1931	595,031	54,311	3,977(*e*)	653,319	85,000	525,900
1932	726,253	42,121	3,106(*e*)	771,480	83,500	630,400
1933	647,149	41,669	4,137(*e*)	692,955	88,500	580,700
1934	560,526	45,522	3,961(*e*)	610,009	112,400	448,500
1935	560,835	47,650	4,064(*e*)	612,549	113,800	448,000

Each main class of fertiliser showed an increase; ammonium sulphate (including ammonia for mixed fertilisers) increased by 102,974 tons of nitrogen, or 11.4 per cent., over the 1934/35 figure. In individual countries, the largest tonnage increases in nitrogen consumption have been mostly in the same countries as last year, viz.: in Germany, the United States, Japan, Italy, Russia, France and Egypt.

Predominance of Sulphate of Ammonia

The order of importance in the production and consumption of nitrogen for agricultural use is roughy as follows: ammonium sulphate, 48 per cent. of all fertiliser nitrogen; cyanamide 12-13 per cent.; Chile nitrate 9-19 per cent.; lime ammonium nitrate ("Nitrochalk" forms) and calcium nitrate each 7-8 per cent.; and other synthetic nitrogenous fertiliser 13-15 per cent. Thus in spite of the rapid increase of synthetic nitrogenous fertilisers (other than sulphate) in recent years, and the revival of Chile nitrate, ammonium sulphate retains its predominance. The rapid increase in the production and consumption of nitrogen for industrial purposes is noteworthy. This is, of course, influenced by quite different causes from those, such as the relative prosperity of the farming community, which affect the fertilizer nitrogen consumption. An unascertainable but large proportion of the consumption for industrial purposes is for explosives manufacture.

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The figures summarised in Table I showing the total production of ammonia products, expressed as sulphate, are calculated on the basis of 25 per cent. ammonia (about 20.6 per cent. nitrogen). The figures for sulphate of ammonia production, however, apply to actual tons of product with a nitrogen content varying from an average of about 20 per cent. in the earlier years to about 21 per cent. in recent years.

Home Agricultural Consumption

Home consumption of sulphate of ammonia showed an increase on the 1934/35 figures of 10,200 tons, or 4.9 per cent., following an increase of 0.7 per cent. in the previous year. Prices were the same as in 1934/35. The increase in the consumption in England and Wales was 3.5 per cent., in Scotland 0.7 per cent. and in Ireland 15.7 per cent., this last being due in part to the larger areas under wheat and beet in the Free State, and the improved prices for potatoes and grass seed in Northern Ireland. The total consumption of pure nitrogen in the British Isles for all purposes amounted to about 91,700 metric tons against 81,300 tons last year, an increase of 12.8 per cent. The tonnage used in industry is estimated at 29,500 tons, against 24,200 last year.

Total exports of ammonium sulphate from Great Britain and Ireland show a decrease of 47,248 tons or about 19 per cent. on last year's figures. Shipments to the principal markets for the past five years were as follows:—

	1931/32	1932/33	1933/34	1934/35	1935/6
	Tons of 2,240 lbs.				
Spain, Portugal, Canaries	184,570	137,570	114,585	93,349	33,254
Japan	52,159	3,000	64,315	7,025	201
China and Hong Kong	44,314	59,817	13,441	6,950	12,221
West Indies, British Guiana and Mauritius	22,859	30,952	22,534	25,361	34,626
India and Ceylon ..	35,421	48,771	51,274	58,172	58,621
Australia and New Zealand	9,498	25,869	13,285	18,781	30,634

Propaganda Work

Speaking generally the fertiliser season closed on a less optimistic note than it opened so far as agricultural prospects are concerned. Whilst the capital financial position of most farmers has been considerably improved, it appears probable that their income for the coming agricultural year will be less than that for 1935/36. Agricultural policy in the main has been directed towards the further development of regulations covering production and marketing. The influencec of national planning has been well illustrated in improved and more stable prices for potatoes brought about by the operation of the Potato Marketing Board. This has been reflected in an increased sale of fertilisers for this crop, particularly in the Fen Country where little nitrogen has hitherto been used. The Hops Marketing Board continues to give growers a profitable and assured market at the expense of restricted acreage. Considerable expansion has occurred in the production of glass-house crops and vegetables, flowers and nursery stock grown in the open. The home bulb-growing industry has also increased under protected conditions. The future of the sugar-beet crop, which absorbs large quantities of fertilisers, has been secured by the rejection of the Greene report which recommended the abolition of Government subsidies.

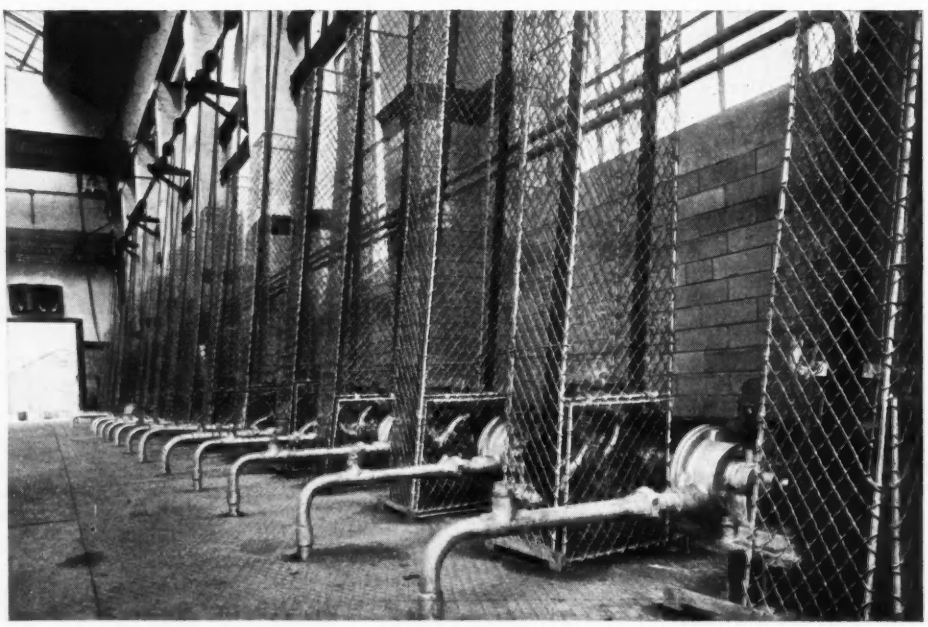
Considerable attention has been paid during the year to problems connected with the artificial drying of grass, as this development represents a new market for the use of all fertilisers, particularly nitrogenous fertilisers. Two farms, one in Cheshire and one in Co. Durham, have been taken over for the purpose of studying the technique of all operations connected with grass drying and it is hoped that in time they will form useful demonstration centres, taking the place in some respects of Jealott's Hill, where it has been found necessary to shift the bias somewhat from fertiliser research to pest control.

In Portugal demonstrations throughout the country continue to fix attention upon the need for nitrogen. In all overseas markets everything possible is being done to offset the effects of difficult exchanges, trade depression and the consequent reluctance of farmers to buy. The experimental and demonstration work which has been done on many crops in India, on rubber in Malaya and on sugar in the West Indies is now bearing fruit. Support continues to be given to the practical study of fertilising problems in many parts of the Empire, mainly by placing at the disposal of the investigators the fertilisers they need for their experiments.

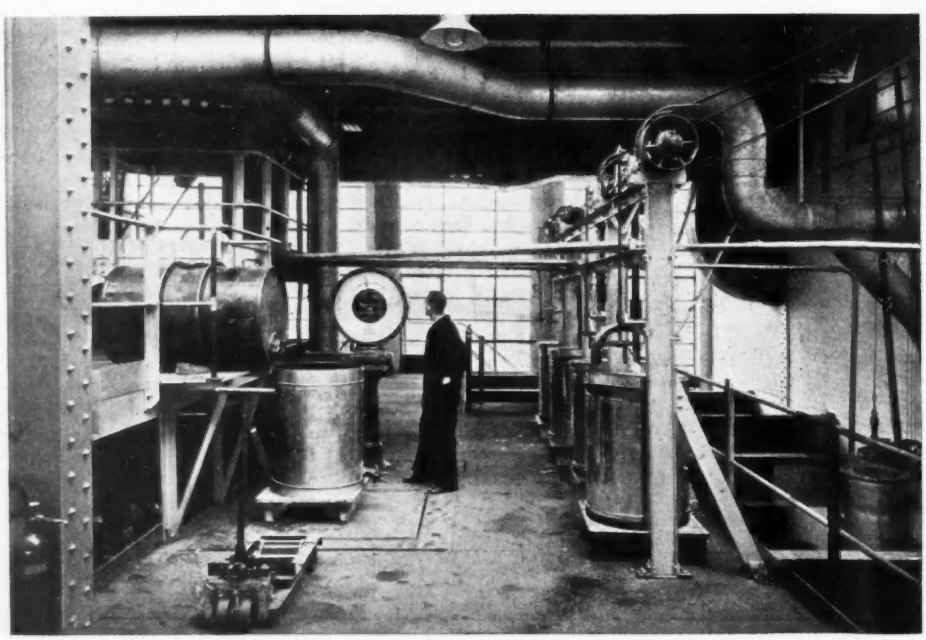
The list of members at June 30, 1936, recorded a total of 206 members, a reduction of five over that of the previous year, due to three amalgamations and two liquidations during the year.

How Accidents are Prevented at I.C.I. Works

EVERYONE in Imperial Chemical Industries, Ltd., takes pride in the low accident rate in the various works and the precautions taken to ensure the safety of the workers. At the recent annual meeting of the company's central council attention was drawn to the encouraging downward tendency of the accident figures and it was suggested that it might be appropriate, at a future meeting, for one of the workers' representatives to speak on safety from the workers' point of view. We are indebted to the editor of "I.C.I. Magazine" for permission to reproduce these photographs, taken in the Smethwick works of the Paints and Lacquers Group.



In the new I.C.I. paint factory the management has provided every facility for safety.



Vigilance, skill and tidiness: the workers share in the responsibility for preventing accidents.

The Development of Crystal Analysis

Sir William Bragg Reviews the Usefulness of X-Ray Investigations

IN every crystal there is a unit of pattern, and the crystal is built of repetitions of this unit in three dimensions of space, said Sir William Bragg, D.Sc., P.R.S., in delivering the Sir Henry Trueman Wood Memorial Lecture before the Royal Society of Arts on December 16, when Mr. John A. Milne, a vice-president of the Society, presided. The subject of Sir William's lecture was "The Development of Crystal Analysis." Every unit, he said, is exactly like every other in composition and internal construction, and is similarly oriented with respect to the crystal. The unit contains a certain number, usually quite small, of molecules and atoms. The dimensions of the unit are so much less, thousands of times less, than the wave-length of visible light that it cannot be perceived by optical means. The wave-lengths of X-rays, being about ten thousand times shorter than those of light, can be used as a means of detection when visible light fails.

A Shadow Picture

There is a certain way of interpreting the X-ray observation which results in the formation of a shadow picture of the contents of the unit cell of the crystal. It is as if some form of radiation cast a shadow of the electrons upon a plane. There are no shadows of the nuclei because they are too heavy in comparison to their electric charges to be affected by the X-rays. The density of the projection varies from point to point: and its distribution can be represented by drawing contour lines. In the figure each contour line passes through points of the same density, *i.e.*, so much electron density per square Angstrom Unit. The length of the Angstrom Unit is the hundred millionth (10^{-8}) of a centimetre. The difference in the densities of two neighbouring contour lines is one electron per square unit. In the case of oxalic acid there are two molecules of oxalic acid in the cell and four molecules of water. All these can be clearly seen in the form of projections of the electron cloud round the various atoms. The electrons must be thought of as continuously on the move, so that the picture shows *average* positions.

In the last few years several of these accurate shadow pictures have been made. The process is laborious, but the labour is well spent, because we gain in this way a new insight into the construction of matter. It is a main object of experimental science to determine as far as possible the relations between construction and properties; one might describe it as molecular engineering.

The Question of Accuracy

The examination of such shadow pictures leads naturally to the question of the accuracy with which measurements of the distances separating neighbouring atoms can be made. These distances can be calculated to about 1 per cent.; thus the distance between the two carbons in the oxalic acid may be stated as 1.43, with a possible error of 0.03. Such an accuracy leads to some very interesting considerations respecting the extent to which the carbon-carbon distance is dependent on the nature of the structure in which it is found. The quadrivalent character of carbon has long been known; it has been fundamental to the study of organic chemistry. The atom of carbon can bind four other atoms to itself, and no more, by what are known as single bonds, as for example, in the case of methane CH_4 or carbon tetrachloride CCl_4. When the structure of diamond was discovered by means of the X-rays, it was found that each carbon atom was linked to four neighbouring carbon atoms which lay at the corners of a regular tetrahedron, the centre of which was occupied by the first atom itself. Thus the tetravalency theory was illustrated beautifully. The carbon-carbon distance is 1.54 Angstrom Units.

The dimensions of the unit cell of a crystal can be measured with a far higher degree than the distances from atom to atom. Accuracies of one part in several thousand are justly claimed. A very minute quantity of impurity added to a pure substance alters the dimensions of the cell by a measurable amount. An analysis of this kind may be specially useful, because it can be made without any treatment of the substance and on very small specimens. In the analysis of organic substances it is found most convenient to work with quantities of about a tenth of a milligram in weight; the specimen is unaffected during the process.

The proteins in their many forms are extremely interesting. The basis of all of them is a zig-zag of carbon and nitrogen atoms, two of the former to one of the latter. Each of the nitrogens has a special attachment of one hydrogen atom, so that it is linked to three atoms in all, as one would expect. Of the carbon atoms on each side of the nitrogen one is doubly linked to an oxygen atom, and the other is attached by single links to a hydrogen and to one end of a side chain which may have many forms, and so give rise to the many kinds of protein. In natural silk, for example, the side chain is in all cases a methyl group CH_3. In the case of wool and horn there are various chains scattered along the same molecule, one of the most important being cystine, which contains sulphur and presumably acts as a preservative. The protein of muscle and nerve does not contain cystine. The contracting and extending properties of hair, wool and muscle seem to be due to the fact that the protein chain can be coiled up in a special way.

Application to Metallurgical Problems

The application of the X-ray methods to metallurgical questions has attracted a large number of workers. The methods are particularly useful in the study of alloys, and as the number of possible alloys is enormous, there is a wide field for exploration. Moreover, alloys have a great practical importance, so that any information which the X-rays can give is likely to be useful. We might suppose that if we knew enough about the structure of the individual atom, we should be able to foretell the properties of any alloy if we were given the arrangement of its component atoms, an arrangement which the X-rays would find for us. Or even further, we might predict the arrangement if we knew the relative proportions of the constituent atoms, as well as the temperature and other pertinent conditions. We are, however, very far from the possession of such powers. Nevertheless, we can determine the arrangement of the atoms in any given case. This gives us exact knowledge of the boundaries of an alloy phase, and gives a new method of drawing the metallurgist's phase diagrams.

Perfect crystals of any size are comparatively infrequent. During the process of the arrangement of atoms and molecules in perfect array, which constitutes the building of a crystal, disturbances from without are apt to interfere. The supply of the necessary material may fail or change its character, temperature may vary, mechanical disturbances may take place. Consequently, the vast proportion of the materials of the world do not assume the form of visible crystals, although some attempt at arrangement is always present. Very often the conditions of formation cause the material to acquire a texture; it is a mass of minute crystals. If a quantity of water is frozen very suddenly, solidification, which is essentially arrangement, sets in about a great number of nuclei and the whole becomes a mush of minute ice crystals oriented in all directions. If the freezing takes place very slowly, it generally happens that the crystals from a few nuclei take precedence over the others and larger angular crystals appear.

The applications of the X-ray methods to specific industrial problems are many, and of widely differing nature. A sub-

department at the National Physical Laboratory deals especially with these questions. It was constituted with the special object of serving industry in this country and has been very busy, said Sir William at the end of his lecture. It is not easy to predict applications which will be useful, even when the problem to be solved is stated, and therefore the earlier work of this department is very much of an experimental character. The reports of the department and their circular to industrialists show some satisfactory successes in attacks on problems submitted to them. They include such matters as the composition of corrosion scales at different points on and below the surface of steel boiler tubes, the reason for the different behaviour of paints which were chemically identical, and the causes of the differences in brightness and other properties of electrolytically deposited chromium.

Detergent Action

Its Relationship to Wetting and Emulsification

DETERGENT action and its relation to wetting and emulsification was the subject of a paper read by Dr. N. K. Adam, F.R.S., at a joint meeting of the Manchester Section of the Society of Dyers and Colourists and the Chemical Section of the Manchester Literary and Philosophical Society on December 18. Mr. A. Gill, chairman of the Chemical Section of the Manchester Literary and Philosophical Society, presided.

Dr. Adam stated it was possible to distinguish between at least five different, but related, processes which might occur when a wetting or detergent or emulsifying agent was dissolved in water and brought into contact with greasy matter. These were (a) lowering of the surface tension of the water; (b) wetting of a solid surface; (c) penetration of the aqueous solution into capillary spaces; (d) dispersion or emulsification of grease or other hydrophobic dirt in the water; and (e) detergent action.

Wetting Agents

Most wetting agents in use contained some hydrocarbon in the molecule, and one or more water-soluble groups, *e.g.*, the alkyl sulphates $R.O.SO_3Na$, or the alkylated and sulphonated naphthalene derivatives. Some substances of this general constitution did not, however, aid in the wetting of all surfaces, especially those which were fairly easily wetting. A very interesting exception found was in the case of the long chain substituted ammonium salts, such as cetyl pyridinium chloride and glass. Clean glass was perfectly wetted by water, but it was poorly wetted by dilute solutions of these substances, which gave the glass a greasy appearance with small drops of water standing on it in place of a continuous film. This was probably due to these substances having positively charged ions at one end of the hydrocarbon chains, and these ions were strongly attracted by the glass which usually assumed a negative charge. Thus the glass, normally a strongly hydrophilic or water-attracting surface, was changed into one largely covered with hydrocarbon, and so its ease of wetting was diminished.

Predominating Factors

Emulsificatin or dispersion of the dirt in the water was not fully understood as yet, but one of the predominating factors was that the interfacial tension between the dirt and the water must be diminished, thus permitting the large increase of surface associated with the dispersion of the dirt to take place with the least possible increase of free energy. The ideal detergent would have to so alter the various surfaces of the water in which it was dissolved as to decrease the tension of the water, to increase its adhesion for the oil (*i.e.*, decrease the interfacial tension against the oil) and to increase its adhesion for the fibre.

There was some ittle experimental evidence that a low surface tension of the aqueous detergent solution against air, or a low interfacial tension against oil, were not the sole or the predominating factors in producing a good detergent. Many substances would lower surface tension considerably, but had no detergent action worth mentioning; an example was soap and alkyl sodium sulphates. They increased wetting, as a rule, but were not necessarily first-class wetting agents for surfaces that were not easily wetted. Measurements made by Robinson and Selby of the interfacial tension between various detergent solutions and oils had shown several points. Sodium cetyl suphate lowered interfacial tension very little more than sodium cetane sulphonate, but washing tests showed that generally the cetyl sulphates were much better detergents than the cetane sulphates. A standard dilute solution of the German detergent, Igepon T., freed from the salts sold with it by a careful extraction process, had its interfacial tension against some oils very much diminished (from about 6 dynes per centimetre to about $\frac{1}{4}$ of a dyne per centimetre) by the addition of calcium chloride in a concentration as low as 0.001 normal in the aqueous solution; but washing tests did not show any appreciable improvement on adding a little calcium to the solution.

Importance of Other Factors

The importance of other factors in detergent action, besides the relation of the aqueous solution to the oil and the properties of the aqueous solution alone, was shown conclusively by the fact that different detergents differed very much in their order of efficiency when used for washing cotton and when used for wool. For wool, some ten different detergents gave a ten- or twenty-fold range of efficiencies, measured by the concentrations required to clean a given standard sample of wool dirtied artificially with Lanoline Black. The same detergents were much more nearly equally efficient when tried on cotton, the best being only about twice as good as the worst. This showed conclusively that the nature of the solid being washed was important.

It was noticed in some washing tests carried out on artificially dirtied wool that the test pieces, particularly with rather dilute detergent solutions, were often cleaner after a minute or two's washing than after half an hour. This rather surprising result was traced to the adsorption of the detergent from the solution occurring on the cleaned wool, to such an extent that the bath became exhausted of detergent so that the dirt held in suspension was re-precipitated on to the cloth.

There was clearly a considerable difference between the ability of different detergents, all of which had a long hydrocarbon chain of 16 or 18 carbon atoms, and a water-soluble end group dissociating electrolytically so as to leave an anion attached to the long chain.

ALTHOUGH strict control measures are in force in Japan covering the sale and storage of potassium cyanide, the Department of Home Affairs has sponsored a move to find some means of giving the poison a distinctive odour and colour. A Japanese journal recently reported that these efforts had led to experiments with a special odour which is so strong that its use would probably cause workmen in the factories using the chemical to raise strenuous objection. It is said that the odour can be detected readily, even if the treated cyanide is carried in small quantities by persons.

Annual Reviews from the Societies

The Ceramic Society

Continued Steady Progress

THE steady progress of the Ceramic Society since its foundation in 1900, recalls to the minds of older generations the previous state of affairs in many industries when "rule of thumb" methods were the order of the day, and the main object of most employers was to guard jealously their cherished "secrets."

The remarkable improvements which have ensued in various industrial processes is undoubtedly mainly due to the activities of the Ceramic Society and other organisations engaged in more or less limited ranges of study and research. The wide distribution of the results of systematic investigations has brought about a general advance in the quality of manufactured products, along with special improvement in the case of products made for meeting exceptionally severe requirements. In the case of ceramic industries, progress has been accelerated by the fact that besides the Ceramic Society, and such organisations as the British Refractories Research Association and technical departments of certain universities, there are well-equipped laboratories maintained by some trading firms and groups of firms. The results of researches are made available for all, or, at least, to all who support the organisations. The Refractory Materials Section began its existence in 1916; the Building Materials Section has now got well into its stride and is doing excellent work.

Fruits of Research

The Transactions of the Ceramic Society may be described as the focus which collects the fruits of research, both in this country and abroad, in as much as it presents abstracts of all appropriate contributions which do not appear at full length in its pages. The activities of the Society during the past year have yielded an ample crop of valuable results. Most of the contributions are mainly of interest to one section, but some possess interest for two sections, if not all three. Examples are "Hot-Face Insulation," by H. V. Allen, and "The Manufacture and Use of the Insulating Firebrick in the United States," by F. H. Norton.

Of the items chiefly interesting to the Pottery Section may be mentioned "The Spitting of Glazes in the Enamel Kiln," by Dr. J. W. Mellor; "Some Recent Developments in Ceramic Firing," by L. Bullin; two papers dealing with silicosis, viz., "The Mineral Content of the Silicotic Lungs of an Earthenware Worker," by Sundins, Bygden and Bruce; and "On the Lung Capacities of Pottery Workers Suffering from Silicosis in Various Stages of Development," by T. Bruce; "Notes on Pottery Plaster," by A. Heath; "Mechanical Handling in the Pottery Industry," by P. C. Bleakman; and on two occasions the ever-popular Question Box.

Items mostly of concern to the Refractory Materials Section are included:—"Experiments on Chrome-Silica Bricks," by Lynam and Rees; "The Behaviour of Refractory Materials under Torsion at Different Temperatures," by Roberts and Cobb; "The Action of Water Vapour on Silica Bricks at High Temperatures and Possible Industrial Significance," by A. E. Dodd; "The Slag Resistance of Steel Works Refractories," by Chester and Lee; "Barium Aluminium Silicates as Refractories and Their Use for Different Technical Purposes," by Dr. F. Singer; "The Properties of Open Hearth Furnace Checker Bricks," by Swinden and Chester.

Items of importance to the Building Materials Section include "Architectural Terra-Cotta and Faience," by G. N. Hodson; "Mechanical Transport in the Brickworks," by J. Procter. Recent papers presented to this section, dealing with "Tested Bricks for Paving Roads," "The Brick in Railway Engineering," and "The Selection and Testing of Bricks for Railways," probably of more than usual importance, though read at meetings held in November, will not be published until next year.

Society of Public Analysts

Membership Exceeds 800

THE roll of the Society of Public Analysts and Other Analytical Chemists is now over 800 and is steadily increasing as it becomes more widely known that membership is not restricted to public analysts, but is open to all qualified analytical chemists. There were eight meetings during 1936, at which papers dealing with the analysis of foods and drugs, organic and inorganic material, and on physical methods of analysis were read and discussed. The February meeting, a joint one with the Food Group of the Society of Chemical Industry, was devoted to a series of papers on tea and coffee, with special reference to their alkaloids and tannins.

The Society has two branch sections—North of England and Scottish—and papers read at the meetings of these sections are subsequently published in the Society's journal, "The Analyst," a *vade-mecum* for practising analysts in every branch of the chemical profession all over the world. The sixth Decennial Index to it will be published early in the year.

The Chemical Society

A Review of the Year's Work

DURING 1936 the Chemical Society has held 18 meetings in London. The Sixteenth Faraday Lecture, entitled "Radioactivity and Atomic Theory," by Lord Rutherford, was held in the lecture theatre of the Royal Institution on February 12; the Fifth Pedler Lecture on "Synthesis in Biochemistry" by Professor R. Robinson on May 28; a lecture on "Mediaeval Paints and Pigments Used in Painting" by Professor A. P. Laurie on October 29; and the Sixth Liversidge Lecture on "Study of Transmutation in the Chemical Laboratory" by Professor F. Paneth on December 10. Four organised discussions were held: on "Stereochemistry," opened by Dr. W. H. Mills on January 16; on "Mesomerism in Organic Chemistry," opened by Professor C. K. Ingold on November 19; a joint discussion with the Faraday Society on "The Kinetics of Gaseous Combustion," opened by Dr. R. G. W. Norrish on February 20; and a joint discussion with the Biochemical Society on "The Chemistry and Biochemistry of Lipoids," in which Professor A. C. Chibnall, Dr. S. H. Piper, Dr. J. H. Quastel, Professor H. J. Channon and Dr. R. G. Cameron took part. Ten meetings were devoted to the reading and discussion of original scientific communications. Twenty-six meetings of the Society devoted to lectures, discussions and the reading of papers were also held outside London.

The ninety-sixth annual general meeting was held at Bristol on April 16, the anniversary dinner taking place in the evening. On April 17 the Hantzsch Memorial Lecture was delivered by Professor T. S. Moore, and visits to works in the vicinity were arranged.

In 1936, 205 new Fellows were elected, and the number of Fellows in the list published in October was 3,683.

The Journal contained 414 original papers, 28 notes, and four lectures, occupying in all 1,862 pages. Vol. XXXII of the Annual Reports on the Progress of Chemistry contained 527 pages. British Chemical Abstracts "A" (Pure Chemistry) contained 1,572 pages. The council has decided that, as from the beginning of 1937, the "A" Abstracts shall be issued in three separate sections.

Eighty-five applications for grants from the research fund were received, the sum applied for being £908 10s. 0d. Grants amounting to £622 were distributed.

The use made of the library by Fellows and by members of the contributing societies continues to increase year by year. In 1935, there were 8,156 attendances, of which 5,128 were made by Fellows and 3,028 by members of other societies,

and 5,509 books were borrowed. The number of volumes added during 1935 was 865, and the library contained at the end of that year 39,675 volumes, consisting of 12,020 books and 27,655 bound volumes of periodicals.

In June, 1935, an agreement was signed setting up a Chemical Council, consisting of representatives of the Chemical Society, the Institute of Chemistry and the Society of Chemical Industry, for the purpose of administering a fund for the co-ordination of scientific and educational publications, the publication of new discoveries, the promotion of research, the maintenance of a library and the provision and equipment of a suitable building or buildings for such purposes. In view of the urgent need for further support for the publications and library, it was agreed that the contributions towards the maintenance of the library of the Chemical Society from the three societies should be proportionate to their membership, thus rendering substantial help to the Society.

British Association of Chemists

A Year of Solid Progress

THE British Association of Chemists records a further increase in membership which now totals 1,824, 107 new members having been eected during 1935-1936. The financial position is very satisfactory. Early payment of subscriptions has made for economy in working. The council appreciates the support it has received from members both in their prompt payment of subscriptions and the generous donations received in support of the Association's work.

The increase in industrial activity has reacted well upon chemical appointments, and the appointments bureau has been particularly active. Members have been able to secure, without difficulty, the minimum salaries recommended by the Association. It must be emphasised, however, that the council is interested not in minimum salaries but in adequate remuneration for work done. An increasing number of members have obtained posts, at substantial salaries, of a highly responsible kind.

Legal Aid Department

The legal aid department has done a great deal of valuable work. The decision of the judge in the case of Rosenthal v. Lancegay Safety Glass Co. upheld the precedent of three months' notice for the chemist in the absence of agreement to the contrary, although in this particular instance the special circumstances in the judge's opinion did not make possible the granting of more than two months' notice. A number of other cases have been settled out of court on favourable terms and in accordance with the precedent established.

A deputation appointed by the Association gave evidence before Sir William Beveridge's committee relating to unemployment insurance. The committee was particularly interested in the operation of the unemployment fund of the B.A.C. and published in full the report submitted to it by the Association. The committee congratulated the deputation on the successful operation of the fund which this year is in a stronger position than ever. Owing to the activity of the appointments bureau, unemployment has fallen sharply during the last twelve months. The reserve is being steadily built up.

Employment of Foreign Chemists

The Association continues to maintain close contact with the Ministry of Labour concerning the employment of foreign chemists in this country. The Ministry has continually approached the Association regarding the question of permits. In the large majority of cases it has been possible to supply a chemist suitably qualified for the post it was required to fill and a number of members have secured valuable appointments in this way. There still exist cases in which the qualifications required are of so unusual and highly specialised a nature that a foreign permit is granted, but the council is satisfied that this never occurs where a British chemist suitable for the post is obtainable.

In general, the year has shown a considerable expansion in every department of the Association's activity. The council, however, impresses upon members and others who are interested in its work the need for continued support of the legal aid fund. The protection of the professional chemist in the courts is a branch of the Association's work which reacts beneficially not only upon its members but upon the whole profession.

Leather Trades Chemists

Work of the British Section

DURING 1936 the British Section of the International Society of Leather Trades' Chemists held two important meetings, one at Leeds University in March and one in London during October. The subjects included bating materials, deterioration of leather, molecular structure of gelatin, sampling of sole leather, tanning from the inkmaker's standpoint, analysis of tanning materials, a new form of colorimeter and sulphonated oils. In addition, two combined meetings with the Federation of Curriers and Light Leather Tanners were held, affording a valuable means of exchange of ideas between trade chemists and the practical tanner and leather dresser. The British Section has been in active co-operation with the British Standards Institution, representatives of the section being on various committees of the Institution.

Following on the success of the last symposium in 1935, on "Emulsions," another is to be arranged to be held next month on the subject of "Wetting and Detergency," details of which will be published in THE CHEMICAL AGE.

The section will take an active part in the bi-annual conference of the parent Society at Copenhagen in September, at which leather trades chemists from all parts of the world will meet. The officers elected for the year 1937 (British Section) are: President, Dr. R. H. Marriott; vice-president, R. Faraday Innes; hon. treasurer, Dr. D. Burton; hon. secretary, A. Harvey; members of committee, Dr. E. W. Merry, Mr. F. H. Quinn and Mr. M. C. Lamb.

Institute of the Plastics Industry

New Education Courses

DURING the year the Institute of the Plastics Industry has been again organised in three sections, holding meetings each month during the winter in London, Birmingham and Manchester. A special feature of the London and district section has been the discussion meetings held jointly with trade and other organisations at which the applications and possible developments of plastic materials in other industries have been reviewed and discussed. A meeting was held with invited representatives of the aircraft industry, at which Mr. Chas. C. Walker opened with a short paper on "The Expanding Aircraft Industry and its Possible Uses for Plastics," and this paper was followed by an interesting discussion. A well attended meeting was held jointly with representatives of the three services at which "The Use of Plastics for the Requirements of the Naval, Military and Air Forces" was discussed.

Six meetings of the Midland Section were held, all being well attended. Of special interest was the paper on "Casein" read by Mr. R. Dodd on January 7, 1936, and that by Mr. P. A. Delafield on "Injection Moulding." In addition to the programme of papers the section organised two very successful dances.

The Northern Section held a joint meeting with the Institution of Production Engineers, and at a subsequent meeting Mr. R. P. Cartwright and Mr. W. A. Brown gave an extremely interesting paper on "Laminated Materials." Four other meetings were held in Manchester.

The Institute, as a whole, held a joint meeting with the Plastics Group of the Society of Chemical Industry on

March 17, at which Mr. K. M. Richards gave a paper on "Colours and Pigments Used in the Plastics Industry, and Their Properties." The fifth annual dinner and dance of the Institute, originally arranged for February, was postponed on account of the death of H.M. King George V, but was eventually held in April 3 at the Hotel Metropole. In spite of having been postponed, and the new date clashing with a meeting of the Northern Section, this function was very well attended.

The annual meeting was held in London on October 27 and the business meeting was followed by a presidential address delivered by Sir Gilbert T. Morgan on "Modern Tendencies in the Chemistry of Plastics."

The Institute has made arrangements whereby educational courses in the "Technology of Plastics" are available in London, Birmingham and Manchester, primarily intended for young men engaged in the industry. Arrangements are being made so that students satisfactorily completing these courses will be awarded certificates, and it is expected that these certificates will in time become recognised standards of education and training. Ultimately full courses will be provided leading to examinations for the Associateship and Fellowship of the Institute. "Transactions" are published twice each year, in January and July, and contain, in full, papers read at all three sections, together with a verbatim report of the discussions.

The British Plastics Federation

Steps Towards Standardisation

ALTHOUGH the British Plastics Federation has not succeeded in persuading all those actively engaged in the plastics industry to become members of the trade organisation, it does represent most of the large interests in the industry. The year has been spent in consolidating its position and most branches of the industry have met in session to consider their respective problems.

The plastics industry continues to gain strong footholds in many additional industries, and the healthy progress which can be recorded of the past year's work can be confidently anticipated in the future.

The Federation has under consideration through its technical committees the standardisation of plastic materials, and is recognised by the associations which deal with such subjects, such as the British Standards Institution, as being a representative body of the plastics industry; and in conjunction with them several specifications are now on the point of completion ready for acceptance by those engaged in the industry. This is all to the good and in the right direction, as no industry can progress beyond a certain stage without some standards and regulation on qualities being set up within the industry itself, and we may expect in the near future greater developments in this direction which should assist in a larger demand for its products by ensuring a recognised standard of quality.

Plastics and Rearmament

The plastics industry is playing its part in the Government scheme for rearmament and is benefiting thereby, but such uses and applications as have been evolved for this particular purpose are not of such proportions to seriously affect the industry when this demand ceases. Further, many of the applications will be easily transferred to peace-time uses, particularly in its adoption in aeroplane construction.

There is a large amount of activity in the resinoid (synthetic resin) branch of the industry, and a large number of patents are being taken out yearly, covering modifications of present types of materials and for new materials. Many of these will not have practical applications, but some will undoubtedly prove to be useful products. The new material of this type, called "organic glass," is proving to have a practical application in the aeroplane industry in spite of its high cost, on account of its less brittle nature and its better transmission of light rays than glass. We may expect further developments in this class of material in the near future.

The Department of Overseas Trade again requested the Federation to organise the plastics section of the British Industries Fair, and the usual amount of space was disposed of for this purpose. The Federation has already been asked to handle the matter for 1937, and, although the amount of space called for is slightly less, the usual applications to be included in this exhibition have been received. The moulding section of the industry is making big strides towards a constructive policy formulated by the Federation, and it is felt that consumers will feel the direct benefit of these organised conditions of trading.

The Colour Users' Association

The Question of Dyeware Prices

ANOTHER active year is recorded by the Colour Users' Association, of which Mr. Arthur K. Davies has occupied the office of president, Sir Henry Sutcliffe Smith that of chairman, and Mr. W. W. L. Lishman hon. treasurer. The question of dyeware prices has again been under consideration as it is felt that these are far too high compared with the prices of other commodities.

Several of the larger dye users had publicly drawn attention to the position in addresses at their annual meetings of shareholders, and the Association felt that some steps should be taken to ensure that the prices paid by users for their raw materials should not be in excess of those paid by their foreign competitors. It is with this object in view, having in mind the necessity for expansion in the export trade, that the council has requested the publicity and statistics committee to undertake an investigation.

The dermatitis committee, which was formed as the result of an invitation extended by the chairman to the various associations and federations interested, has continued its work of investigation with regard to claims for alleged dye dermatitis. A great deal of work has been done in the consideration of details of claims submitted by various interested concerns.

The consolidation of the protectionist principles of the Government has been carried a step further by the extension of the Safeguarding of Industries Act, 1921, for a further period of ten years.

Compliments of the Season

A Goddess from South India

THE good old custom observed by many firms in the chemical industry of sending out calendars and diaries as expressions of the season's good wishes seems to have been discontinued in several directions this year. We are, however, happy to acknowledge a few such tokens, together with numerous Christmas and new year cards from subscribers and advertisers.

From the Government Soap Factory, Bangalore, we have received a decided novelty in the form of a beautiful miniature carving, in sandalwood, of the great goddess, Maha Deva Amma.

The Staveley Coal and Iron Co., Ltd., has issued its usual leather bound pocket diary, with a convenient refill for the second half of the year.

From Raybestos-Belaco, Ltd., we have received a daily tear-off wall calendar, adorned with a coloured reproduction of feminine beauty.

As usual the calendar received from the Clayton Aniline Co., Ltd., is an exquisite reproduction of a first class work of art. The subject this year is "Golden Pippins," from an oil painting by Alfred Strutt, R.B.A., which was hung in the Royal Academy in 1890.

Institution of Chemical Engineers

Dominant Features of the Year

THE dominant features of the year for the Institution of Chemical Engineers have been the Chemical Engineering Congress, already fully reported in THE CHEMICAL AGE, and the joint tour through the West of England and North Wales with the American Institute of Chemical Engineers. While the Chemical Engineering Congress was organised under the auspices of the World Power Conference, it made considerable demands of the personnel of the Institution, which supplied over eighty per cent. of the officers and members of committees. In addition, twelve of those key-men in the organisation, the general reporters, were members of the Institution, and the Institution, jointly with the Chemical Engineering Group, acted as the authoritative body for eleven of the papers contributed from Great Britain, while fifteen members were authors or part-authors of papers.

On the Tuesday evening of the congress week the annual dinner of the Institution, which had been postponed owing to the death of King George V, was held. The Institution had the pleasure of including among its guests the entire American party and the principal delegates from other countries. Twenty-one countries outside the British Empire were represented.

Tour with American Institute

The joint tour with the American Institute followed immediately after the congress with a visit to Canterbury and Rochester on Sunday, June 28. On the Monday the party left London and the principal points visited were: Winchester; Salisbury; Bath, where the party was entertained by the civic authorities and by the local branch of the English-Speaking Union; through part of the Wye Valley to Gloucester; Stratford-on-Avon, where a special performance was given at the Shakespeare Memorial Theatre; via Llangollen, Llanberis, Conway, to Llandudno, and Chester, where the farewell dinner took place on Saturday, July 4. On the following day the party was conveyed, via the Mersey Tunnel, to Liverpool, to participate in the annual meeting of the Society of Chemical Industry.

At the fourteenth annual corporate meeting in March, Dr. Herbert Levinstein was re-elected president, and under his able and genial guidance the Institution has had a year of great activity during which the steady increase in membership has been maintained. At the same meeting Mr. H. W. Cremer and Dr. A. J. V. Underwood were elected joint hon. secretaries, Mr. Cremer no longer having the necessary time available—with the increasing work of the Institution and the growing pressure of his private affairs—to remain sole hon. secretary. The new elections to the council for the year were: Mr. Hugh Beaver, Colonel E. Briggs, Mr. R. F. Stewart and Mr. Keith Fraser. In an outstanding address on "The Grant of Trading Monopolies—Then and Now," the president gave a clear and valuable exposé of the growth of patent law.

The Year's Medallists

The Moulton Medal for 1935 was awarded for the paper "Evaporation of Water from Plane and Cylindrical Surfaces," by Mr. R. W. Powell and Dr. Ezer Griffiths, F.R.S., of the National Physical Laboratory. No award of the Junior Moulton Medal was made. The Osborne Reynolds Medal was awarded to Mr. F. A. Greene in recognition of the many valuable services he has rendered to the Institution since its foundation, and especially as hon. treasurer since 1929. The first award was made of the William Macnab Medal for the best answers submitted in the Associate-Membership Examination to Mr. D. K. Moore.

For some considerable time the accommodation occupied by the Institution had been considerably outgrown, and the time was overdue when more suitable premises should be acquired. Accordingly, in March, the Institution was removed to its present address at 56 Victoria Street, Westminster, where there is ample room for expansion. At the end of the year Dr. G. W. Himus relinquished the office of hon. librarian, after serving four years in that capacity, and was succeeded by Mr. F. J. Bailey.

The public lecture of the year was delivered on October 30 by Professor F. A. Lindemann, F.R.S. The subject was "Research at the Lowest Temperatures and its Importance to Industry," and attracted a large audience. The graduates' and students' section held six meetings during the year, in addition to the annual informal dinner at which the president was the principal guest. At the annual meeting of the section, held in May, Mr. N. C. Fraser was re-elected chairman, and Mr. A. P. Buchanan succeeded Mr. D. Gordon Bagg as hon. secretary. The eleventh examination for Associate-Membership was held during the year. Eight candidates were examined, of whom two satisfied the examiners.

New Act and the Chemical Trade

Employment of Women and Young Persons

ALTHOUGH few firms work up to the limit of hours of employment laid down in the chief Factory and Workshop Act for women and young persons, the fact that these are scheduled by naming the actual daily hours, 6 a.m. to 6 p.m., 7 a.m. to 7 p.m., and so forth, precludes any working in shifts. By temporary provisions, however, a qualified departure from these hours has been permitted, but from January 1, 1937, these rules—modified and altered—with new provisions, will operate permanently.

On that date the Employment of Women and Young Persons Act, 1936, comes into operation. This measure allows working in shifts, but as any system must operate between the hours of 6 a.m. and 10 p.m. on any week day except Saturday (Saturday the hours are 6 a.m. to 2 p.m.) and each shift must not exceed an average of eight hours per day ordinarily, it will be seen that only a two shift system can be worked. If, however, an establishment has adopted a five-day week, a shift can be worked up to ten hours on average per day, but the aggregate for any week must not exceed 48 hours, nor for any consecutive two weeks 88 hours. Meal times must be allowed as under the chief Factory Act, an interval of at least half an hour for meals must be allowed a woman or young person in a factory, and a young person in any workshop, after any five hours continuous work.

An important point to note, is that this Act does not give general power to industry to work a shift system; the permission is given individually to each firm by the Home Secretary when the employer must apply to the Home Office, and as regards existing businesses a system cannot be authorised unless a majority of the workpeople consent to the adoption of a shift system, and their views must be ascertained by a secret ballot. This Act applies to women (meaning females of eighteen years and upwards) and young persons (term ordinarily means persons of either sex under eighteen years, but for this Act the age of sixteen years must have been attained). Furthermore, the secret ballot must be taken by rules laid down in the Special Order, the procedure being the same as used in Parliamentary and similar elections.

The Home Secretary has power to revoke an Order if he is satisfied that abuses have arisen or conditions have not been complied with, and similarly he can revoke an Order if any shift system authorised has not been worked for more than twelve months. If the authorised system has operated less than two years, the Order is automatically revoked.

The British Synthetic Fertiliser Industry

Progress at Home and Overseas

IT is not always realised that the manufacture of synthetic nitrogenous fertilisers is a home industry of comparatively recent date. Throughout the war period and up to 1924, Britain was entirely dependent upon her gasworks, coke ovens and other distillation industries for supplies of sulphate of ammonia; there was no production of "synthetic" fertilisers, *i.e.*, of fertilisers that are "built up" from their constituents by chemical means. To-day, thanks to the constructive enterprise of Imperial Chemical Industries, Ltd., there is not only an abundant production of synthetic sulphate of ammonia for helping to supply the home market and for shipping overseas, but the new synthetics, "nitro-chalk" and concentrated complete fertilisers, are now manufactured on a large scale and consumed in increasing quantities year by year.

Increased Production in 1935

In the calendar year 1935 the total production of sulphate of ammonia in the British Isles was about 448,000 tons (practically the same as in 1934), and sales for home agricutural consumption during the fertiliser year ended June 30, 1936, amounted to 219,700 tons, representing an increase of 10,200 tons over the previous year. It is interesting to note that this fertiliser still retains its predominant position in the British Isles, as indeed it does in the world as a whole. In the quinquennium 1924-5/1928-9, our consumption of sulphate represented, in terms of nitrogen, 82 per cent. of all the nitrogenous inorganic fertilisers consumed; in the succeeding quinquennium it was 81 per cent.; but in the last two years it has fallen to about 75 per cent., not because less has been used, but because sales of "nitro-chalk" and of concentrated complete fertilisers have expanded so remarkably. In the whole world it is estimated that 48 per cent. of all the fertiliser nitrogen consumed is in the form of ammonium sulphate.

In the past fertiliser year the consumption of sulphate in England, Wales and the Channel Islands increased by 3½ per cent. over the previous year; in Scotland by 0.7 per cent., and in Ireland by no less than 15.7 per cent., this large increase being no doubt due to the greater production of wheat and sugar beet in the Free State, and to better prices obtained for potatoes and grass seed in Northern Ireland. Over the whole British Isles the increased consumption was 4.9 per cent., as compared with 0.7 per cent. for the previous year.

The Overseas Market

The above figures show that progress has been substantial in the home market. Unfortunately the same cannot be said of the export trade. The decline of about 19 per cent. in export sales is, however, readily understood in view of the numerous influences that are now restricting foreign trade. For example, Japan, in pursuance of her autarchical aims, is cutting out the foreigner from her nitrogen market, and in consequence our exports to her have fallen almost to vanishing point. Further, the valuable market for sulphate of ammonia in Spain, and the smaller, though important, market in the Canary Islands, have been very seriously affected by the disturbed political conditions ruling in those countries. Fortunately the picture is not so black as these two examples would suggest. Exports of sulphate of ammonia to India and Burma have increased by 31¾ per cent. over the previous year; to the West Indies, British Guiana and Mauritius by 36½ per cent., and to Australia by no less than 86¾ per cent. Generally the overseas Empire market appears to be in a very healthy condition, and, although the wish may in part be father to the thought, it seems not unlikely that what we lose on the swings in foreign countries we may in time recover on the roundabouts of the Empire overseas.

Nor are the possibilities at home by any means exhausted. If recent history may be taken as a guide there seems little doubt that our farmers, despite recurring "bad times," are gradually becoming more "fertiliser-conscious"; a result which may be ascribed to the growing enlightenment of the younger generation of farmers, and more recently to the better cash returns received by farmers in general. With the exception of the fertiliser year 1931-2 the consumption of nitrogenous fertilisers per acre of cultivated land has steadily increased in the last twelve years: from about 2 lb. of nitrogen per acre in 1925 to about 3 lb. per acre at the present time; and for arable land only from under 5 lb. to about 8.0 lb. per acre during the same period.

According to a trustworthy German source, the corresponding increase in the consumption of phosphoric acid in the British Isles has been very much less, but the use of potash appears to have risen concomitantly with that of nitrogen. It is true that we still stand far behind certain other countries, like Holland, Belgium and Germany, in our consumption of purchased fertilisers per unit area, but conditions in those countries are very different from our own.

Possibility of Increased Productivity

There can be no doubt that productivity at home could be immensely increased if the means were available; thus it has been estimated that our yield of grass on the present grassland area would be at least doubled could we adequately irrigate our pastures and apply the optimum dressings of nitrogen, fortified by phosphate and potash, which the increased water supply would allow. But disregarding these rather ideal considerations, there are a number of facts which spell hope for the home industry. Farming is certainly more remunerative than it was a few years ago; and the nation is waking up to the realisation that a prosperous farming community is a very important factor in the demand for manufactured goods.

Reclamation of derelict land, the opening up and more intensive use of upland areas, and the improvement of marginal land, will all call for more fertilisers. In fact, it would almost appear that far from having witnessed the meridian of fertiliser consumption we have only been gazing at the morning star. Progress may have appeared slow to those who recognise the potentialities, but it has been real; and in one important respect at least we have vastly improved upon our position of 20 years ago.

Indian Chemical Notes

The New Tata Laboratory

IT is stated that the new laboratories of the Tata Iron and Steel Co. which are being constructed at Jamshedpur, India, at a cost of Rs.10 lakhs, will play an important part in the progress and development of the steel industry in India and in the training of an efficient body of Indian research workers in the metallurgy of iron and steel.

Spirit Industry

The chief difficulties and problems of the spirit and pharmaceutical industry of India have been brought out in a special memorandum by the Alembic Chemical Works Co., of Baroda, which has submitted it to the Government of India with a special appeal to the Viceroy by Mr. B. D. Amin, managing director of the company. It is pointed out that the handicaps to the industry arise from the inter-provincial barriers to trade caused by the varying excise restrictions on transport and movement of the provincial governments. The memorandum asks for uniformity of excise duty and excise rules throughout India and also for drug control legislation.

New Technical Books

COLLOIDICS (Kolloidik). By Dr. A. von Buságh. Dresden and Leipzig: Theodor Steinkopff. RM.16.50.

This introduction to the problems of modern colloid science possesses a well considered plan and a short, pithy presentation which complies with the most varied research fields, methods and problems of the new "colloidics" (colloid chemistry and colloid physics). These descriptions make Dr. von Buságh's book, over and above being an introduction, a valuable assistance not only for the colloid scientist whose profession it is, but also for everyone interested in colloid scientific problems.

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HIGH-MELTING HARD MATERIALS AND THEIR TECHNICAL APPLICATION (Hochschmelzende Hartstoffe und ihre technische Anwendung). By Dr.-Ing. Karl Becker. Berlin: Verlag Chemie, G.m.b.H.

This book is a supplement to the compilation of patents so far taken out in the hard-metal field during the years 1933 and 1934. Although it is a comparatively small book, Dr. Becker has understood the task well of describing in a few words the essentials of the various working methods. The list of the most important patents in different fields of high-melting hard materials is as interesting as instructive.

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HYDROFLUORIC ACID, FLUOSILICIC ACID AND THEIR METALLIC SALTS (Flussäure, Kieselflussäure und deren Metallsalze). By Dr. Oskar Kausch. Enke's Library for Chemistry and Technique, Vol. 24. Stuttgart: Ferdinand Enke.

The great significance which hydrofluoric acid and fluosilicic acid and their metallic salts have on the most varied fields of the chemical industry has induced Dr. Kausch to publish this book. He calls it—all too modestly—a survey of the properties, manufacture and application of these important materials. The book is very much more: it is a complete collection of the relative literature and patents, and thereby a compilation of the experiences and inventions connected therewith in this large field of fluorine compounds. Dr. Kausch takes into consideration no less than 1,200 authors, with about 2,000 publications.

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INORGANIC AND THEORETICAL CHEMISTRY. By F. Sherwood Taylor. Third Edition. Pp. 832. William Heinemann, Ltd. 12s. 6d. net.

This book is more than a mere text-book. It provides all the facts and principles which are needed for a useful study of inorganic chemistry, and it presents them in a sequence which achieves good teaching. In addition, it provides for two concurrent courses by having portions of the text in a smaller type. The larger type matter comprises all that an intelligent student might study in the first 18 months after matriculation; smaller type is used for the supplementary matter which is needed up to the end of the second university year. Approximately one-quarter of the total number of pages are devoted to the fundamental principles of chemistry and to those physical studies which are essential for a correct understanding of chemistry in its inorganic aspect, *i.e.*, such phenomena as hydrolysis, diffusion, and reversible reactions. The remainder of the book covers inorganic chemistry arranged on the plan of the Periodic Table, but changes from such a fixed course of study are made possible by cross references throughout the text. Dr. Taylor has not been conventional in presenting his facts, and it is equally true that he offers nothing which is startling. It is just his good knowledge of the needs of the student that makes this book so acceptable. To those who are actually earning their living in an atmosphere of chemistry there is also ample matter to provide a good refresher course of study. First published in 1931, a second printing of the third edition (March, 1935) has now become necessary.

INORGANIC CHEMISTRY. By Sir Gilbert T. Morgan and Francis Hereward Burstall, of the Chemical Research Laboratory, Teddington. Pp. 462. W. Heffer and Sons, Ltd. 15s.

This book is an amplification of the subject matter of three lectures embodying a survey of modern inorganic chemistry delivered before the Institute of Chemistry in May, 1933. Many important discoveries have been made in inorganic chemistry, some of which may well be regarded as of epoch-making significance. Until 1933, for instance, the existance of heavy water was not suspected and remained undetected. To find an appropriate parallel, one should recall the year 1894, when atmospheric air was shown to contain a new chemically inert gas not before recognised. Remarkable progress has also been made in the last few years both in the artificial disintegration of chemical elements and in the production from non-radioactive matter of a new series of evanescent elements having induced radioactivity. It is such matters as these which show a need for a new inorganic chemistry of the type under review. In mentioning each salient new fact the authors have given the discoverer's name and the year of his discovery, and have refrained from including full reference to the literature.

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INTRODUCTION TO THE SCIENCE OF COLLOIDS (Einführung in die Lehre von den Kolloiden). By Professor H. Bechhold. Dresden and Leipzig: Theodor Steinkopff. RM.10.

In the Institute for Colloid Research in Frankfurt-on-Main there are "Colloid Courses" under the direction of Professor Dr. H. Bechhold, where a series of first-class experts give lectures which altogether form a survey of limited fields of colloids. The present volume contains the following works: H. Bechhold, "What are Colloids?"; R. Schwarz, "The Production of Colloid Systems"; Lothar Hock, "Colloid Particles as Physical Molecules"; E. Heymann, "Boundary Surfaces and Boundary Surface Reactions"; Lothar Hock, "Sol, Gel"; E. Heymann, "Electric Properties of Colloid Systems"; F. Erbe, "Separation and Purification of Colloids"; E. A. Hauser, "Optics of Colloids"; R. Brill, "The Investigation of Colloids with X-Rays."

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METAL CERAMICS (Metallkeramik). By Dr. Franz Skaupy. Berlin: Verlag Chemie, G.m.b.H.

As a supplement to Skaupy's chief volume on the manufacture of metal bodies from metal powder (Metallurgy of Metal Powder), this book describes progress since the latter's appearance more than four years ago. Meanwhile, metal ceramics have developed very much further indeed. Especially has great progress been made with metals of the iron group, iron and nickel. The production of porous, so-called oilless bearings is also very interesting. This and other results have been duly considered in this little supplement. The reproduction of a large number of patents enables one to refer to the original works.

* * *

TEXTBOOK OF CHEMICAL TECHNOLOGY (Lehrbuch der chemischen Technologie). By Ost-Rassow. 19th Edition. Leipzig: Max Jänecke.

The chemical industry did not only become a great power in the last century, but during this century it has grown capricious in its versatility. The idea of summarising this variously incorporated, and often scarcely connected industry, in a single book, of only just over 900 pages, and to describe it graphically, is an idea on a very large scale, and a courageous one. That the book could appear in 19 editions during the course of about 30 years shows the gigantic success of a work which presents practically every manufacturer of the chemical industries and their connections shortly in single, independent chapters.

Personal Notes

MR. FREDERICK BARKER, bleacher and dyer, of Rochdale Old Road, Heywood, Lancashire, left estate valued at £14,613 gross, with net personalty £12,848.

MR. JOHN S. RUNTZ, of Hove, who served on the board of the Gas Purification and Chemical Co., left estate valued £52,417, with net personalty £46,525.

MR. WILLIAM P. CAMPBELL, of Hagerston, has received the first award of two thousand dollars from the Squibb Fellowship at Harvard University for research upon phenanthrene. The Squibb Fellowship for research in organic chemistry was founded by E. R. Squibb and Sons, of New York.

DEAN FRANK C. WHITMORE, of the School of Chemistry and physics, Pennsylvania State College, has been elected president of the American Chemical Society for 1938. Dr. Edward R. Weidlein, director of the Mellon Institute of Industrial Research, Pittsburgh, has become president, succeeding Professor Edward Bartow, of the State University of Iowa.

CAPTAIN EUAN WALLACE, Minister for Overseas Trade, states in a new year message that 1936 gave a high and increasing level of prosperity in the home market, a volume of industrial production without precedent in our history and a record number of our people in whole time employment. We still hold the first place in world trade.

PROFESSOR J. B. S. HALDANE was overcome by poison gas while experimenting in Madrid on Wednesday, and is now in bed under medical care. He went to Madrid a week ago to help the authorities to provide gas masks for the civil population, and when the mishap occurred he was testing Spanish-made masks in mustard gas.

LORD INVERFORTH has joined the board of the Irish National Oil Refineries Co. Announcement is also made that he has just been appointed chairman of the Liffey Transport and Trading Co.

DR. JOSEPH S. PEARSE, of Plymouth, bequeathed half the residue of the estate to the Plymouth Education Authority to be devoted to scholarships and prizes in chemistry and certain other subjects. The amount so to be devoted is approximately £2,400, and the secretary of education has been instructed to draw up a scheme for the administration of the endowment.

MAJOR E. F. W. MACKENZIE, of the Royal Army Medical Corps, has been awarded the Parkes Memorial Prize for his investigations upon the ammonia-chlorine process for water purification in the field and research in connection with food supplies in India. The Parkes Memorial Prize is awarded annually to the officer who has done most to promote the advancement of naval or military hygiene by professional work of outstanding merit.

PROFESSOR ALEXEI CHICHIBABIN and PROFESSOR VLADIMIR IPATIEFF are to be expelled from the Russian Academy of Science. They are accused of working for their personal profit and glory instead of the glory of the Socialist Fatherland. Both have been employed on petroleum research work. Professor Ipatieff is at present engaged in research at one of the large American oil companies, while Professor Chichibabin is working in Paris. Professor Kapitza, the famous Russian physicist, of Cambridge University, whose Soviet visa to return to work in England was refused last year, now has a laboratory in Moscow.

Chemical Centenaries of 1937

By HARRY T. BUTCHER

FEBRUARY, 1937, is the centenary of the death of Edward Turner, professor of chemistry at University College, London. His works included "Elements of Chemistry" (eight editions) and "Introduction to Study of the Laws of Chemical Combination and the Atomic Theory." His most important work was on the atomic weights of the elements; he also studied the constitution of ores and oxides of manganese.

Edward Divers, who was educated at the Royal College of Chemistry, and in 1886 became professor of chemistry at the Imperial University of Japan, was born on Novemeer 27, 1827. He became vice-president of the Chemical Society in 1900, was president of the Chemical Section of the British Association for 1902, and president of the Society of Chemical Industry in 1915.

Henry Draper was another celebrity born a century ago. In 1873 he began to teach analytical chemistry in New York University, on the death of his father, John William Draper, in 1882, became professor of systematic chemistry at that university. In 1864 he published his " Text-Book of Chemistry," and gave promise of a career even greater than that of his father, but died in 1882 from pneumonia contracted during an excursion to the Rockies.

June 25 marks the centenary of the birth of George James Snelus, F.R.S. His first appointment was that of chief chemist to the Dowlais Works, and he was famous as the first to make pure steel from impure iron in a Bessemer converter lined with basic materials. His books included " Iron and Steel in Chemistry as applied to the Arts and Manufactures."

Alexander Norman Tate, the famous analytical chemist, was born on February 24, 1837. In 1863 he established a consulting and analytical practice in Liverpool, specialising in the analysis of oils and fats. He was an original member and sometime president of the Society of chemical industry.

James Douglas, professor of chemistry at Morrin College, Quebec, was another celebrity born in 1837.

In 1837 Otto Runge first produced coal-tar colours. Augustus Granville (who had introduced iodine into England) advocated Martin's plan for purifying the Thames. Justus von Liebig (the founder of agricultural chemistry) wrote on analysis of organic bodies; and Robert Wilhelm Bunsen wrote on the properties of hydrated oxide or iron. In the same year Thomas Graham (first president of the Chemical Society, and noted for his investigations into the diffusion of gases and liquids) became professor of chemistry at University College, London; James Young (of paraffin oil fame) accompanied him from Glasgow as his assistant.

Auguste Laurent, the French chemist, who is remembered chiefly for his work on atomic weights and the classification of organic compounds, became professor of chemistry at Bordeaux in 1837. John Canton first came to London in 1837. His researches on the question of artificial magnets procured his election at F.R.S., and he discovered the so-called Canton's phosphorus which is luminous in the dark after exposure to sunlight.

Among the bicentenaries celebrated this year is that of the birth of Bryan Higgins, who, in 1774, established a school of chemistry in Soho. In the following year he entered into a dispute with Priestley, whom he accused of copying some of his experiments on air.

Louis de Morveau, also born in 1837, was associated with Lavoisier, Berthöllet, and Fourcroy in writing part of the " Dictionnaire de Chimie." In 1778 he founded a saltpetre manufacture on scientific principles, and a few years later joined to it the first soda-works established in France.

Richard Watson, born August, 1737, became Bishop of Llandaff, and in his " Chemical Essays " he described experiments by which he obtained gas, coke, and ammonia from coal.

The Making of Emulsions

A Simple Technique to Obtain Stability

EMULSIFICATION should be regarded not as a mechanical process, but rather as a physico-chemical process. When two immiscible liquids, such as mineral oil and water, are shaken together, one liquid becomes dispersed in the other in more or less small globules. This dispersion is not stable, and the globules of oil and water rapidly separate and coalesce, forming again two layers of the distinct liquids—one of oil, one of water. Such a system is not an emulsion; it lacks stability, a very essential property of an emulsion, though not the most essential property.

To produce a perfectly stable emulsion of two immiscible liquids there must be a third substance present, the emulsifying agent. It is possible to prepare fairly stable dispersions of oils in water, which are ranked as emulsions, but they can only be viewed from an academic standpoint, they have no practical value, their concentration is too low, their preparation too costly, and they are totally deficient in all the valuable properties possessed by emulsions correctly made with suitable emulsifying agents. An emulsion should be regarded as a three-phase system and not as a two-phase system.

The presence of the emulsifying agent is to ensure (1) lowering the interfacial tension between the two liquids; (2) charging the dispersed particles with electricity of the same sign so that the particles repel one another; and (3) enveloping the particles by a more or less elastic film of adsorbed emulsifying agent.

It cannot be too strongly stressed that in every case in the preparation of an emulsion it is essential not only that the physical conditions should be correct, but that the emulsifying agent and method of preparation should also be correct. It must also be understood that the disperse phase of an emulsion is not necessarily a simple substance, it might consist of a mixture of several materials, or as many more as may be desired. Tar distillation fractions are frequently complex mixtures and these are emulsified in practice for many purposes, such as disinfectants and horticultural sprays.

The great importance of emulsions in many industries and many technical processes has been emphasised by the Amoa Chemical Co., Ltd., in their literature for the past fifteen years. They have just issued a 40-page brochure which gives a brief description of "Amia" products and the value of them to the chemist and processor, whether dyer or finisher, and to lay before them methods of employing "Amoa" and products or emulsions made therefrom. The variations in the emulsifying agents offered by this company are specially designed to meet the varying ways in which different processes are approached by the operators, and the skill, or lack of experience and skill, brought to bear by them on the products and processes.

Although the "Amoa" products place in the hands of the chemist an extremely flexible method of making the type of emulsion he desires, it is essential that the instructions of the makers be rigidly adhered to. In certain cases oils can be made soluble by the simple admixture of the correct quantity of the agent and this mixture diluted with water as and when required for use. In most cases, however, it is necessary to build up the emulsion by successive additions and mixings. When this is the case it is highly important, especially in the initial stages, to add the material to be emulsified in small quantities and to mix very thoroughly between each addition. Generally speaking, the process consists in first making a concentrated emulsion, either by mixing the oil, agent and water all together, or by blending the oil and agent, then mixing in water. This primary concentrated emulsion is then "expanded" by successive additions of the oil, during which the emulsion becomes more and more of a jelly-like consistency.

For making in bulk, any simple form of mixer will be found satisfactory, but the best type is one fitted with intermeshing rotating blades and arranged so that there is a minimum of space between the blades and the sides and bottom of the container. This latter point is very important, for in producing the initial concentrated emulsion comparatively little material is in the mixer and unless the blades fit closely a thorough mix is impossible.

Coal and Allied Industries, Ltd.

Extraordinary General Meeting Adjourned

LORD ELDON presided at a crowded extraordinary general meeting of Coal and Allied Industries, Ltd., in London, on Thursday, at which a resolution was proposed for the voluntary winding up of the company "by reason of its liabilities." The board had informed the shareholders by circular letter that the amount of applications for the £220,000 five per cent. convertible non-cumulative income debenture stock recently offered to shareholders for subscription at par was negligible, and that the company was unable to carry on business.

Several shareholders strongly criticised the policy of the board and opposed the proposed winding up. On being put to the vote the resolution was heavily defeated.

Mr. Godfrey, a member of the Stock Exchange, who said he represented a large number of other shareholders, moved the adjournment of the meeting for one month and the appointment of a committee of shareholders to investigate the transactions of the company and to consider any suggestions for its continuance. He declared that with adequate capital and proper administration the company could be revived as a profitable undertaking, and he suggested that sympathetic consideration might be obtained from Lord Nuffield's committee which was expressly concerned with the depressed areas, in one of which the company's plant was situated.

Mr. Godfrey's proposition was carried, and at the close of the extraordinary meeting the shareholders met to appoint their committee of inquiry.

The company, which was formed in 1909, has erected a plant at Seaham Harbour for the low temperature carbonisation of coal, which commenced production of petrol in September last. A fortnight ago the directors announced that the company had expended the whole of its available resources, and that they planned an issue of £220,000 5 per cent. convertible non-cum. income debenture stock at par. Lists for the issue closed on December 22.

The company's technical adviser, Mr. A. Fisher, B.Sc., A.I.C., reported to the directors that, subject to the carrying out of certain modifications which he considered necessary, involving an expenditure of £150,000, the plant would by the beginning of 1938 be capable of earning a profit of approximately £66,000 a year. The issued share capital is £244,802 10s. in 5s. shares. Lord Eldon is chairman and Mr. F. C. Marten is deputy chairman.

Chemical Engineering Congress

Financial Statement

MR. M. W. BURT, general secretary, has issued the following condensed statement of income and expenditure in connection with the Chemical Engineering Congress of the World Power Conference, held in London from June 22 to 27, 1936:—

Income:—Donations, £5,093 9s. 4.; membership fees and sale of papers, £1,252 6s. 1d.; total £6,345 15s. 5d.

Expenditure:—Editing and printing of papers and transactions, £2,897 19s. 4d.; banquet, reception, visits, £491 18s. 1d.; general expenses, £2,951 18s. 0d.; total £6,345 15s. 5d.

Chilean Nitrate and Iodine

Extended Propaganda Activities

THE balance sheet of the Chilean Nitrate and Iodine Sales Corporation shows a profit of £2,123,738 7s. 1d. for the year ending June 30, 1936. This profit represents the difference between the price at which, in conformity with Chilean Law, the Corporation has acquired the nitrate and iodine sold by it and the net price realised for same, plus income derived from subsidiary activities, and after providing prudent reserve for operations pending at June 30, 1936.

The production of nitrate during the year increased by 7.26 per cent. over that of 1934-1935, and exports were 5.59 per cent. higher than the figure for the same period. The total number of workmen and employees engaged by the nitrate industry in Chile as at June 30, 1936, amounted to 25,494, as compared with 23,873 at June 30, 1935. The total of world sales of nitrate during the year 1935-36 was 5.61 per cent. greater than during 1934-35, when the increase, as mentioned in our previous report, was 31.8 per cent., as compared with the figure for the year 1933-34.

The board has continued to give special attention to the improvement of the organisation for the distribution and sale of nitrate, and various measures have been adopted tending to greater efficiency in these services. Propaganda activities have been further extended, technical personnel having been increased by 22 per cent., as compared with the previous year.

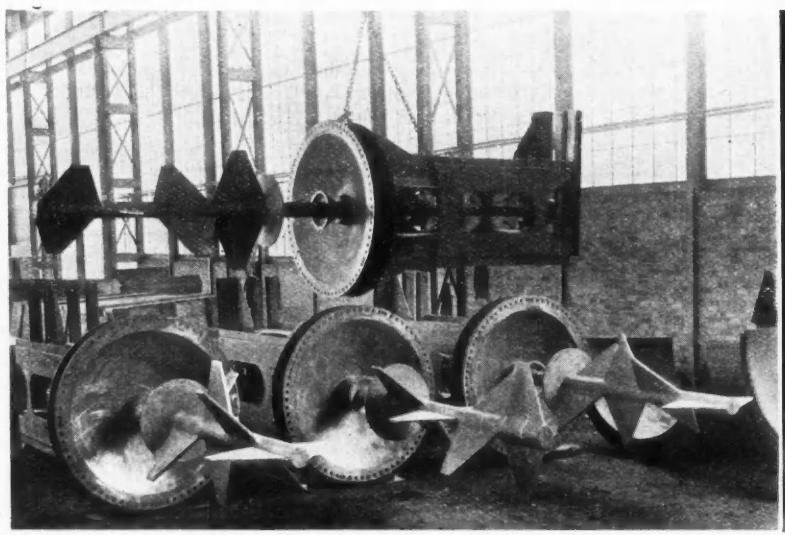
With the exception of those countries in which the importation of iodine is impeded by special legislation, a competitive policy has been observed in all markets. Sales of iodine increased by 59 per cent., as compared with the previous year's sales. The board has constantly endeavoured to maintain a sufficient world stock of iodine so as to meet any additional demand and, at the same time, to protect industry against possible restrictive measures in other markets. In the course of the year which is covered by the present report, the new plant at Oficina "pedro de Valdivia," the property of the Lautaro Nitrate Co., Ltd., commenced the production of iodine.

Chemical Plant Activities

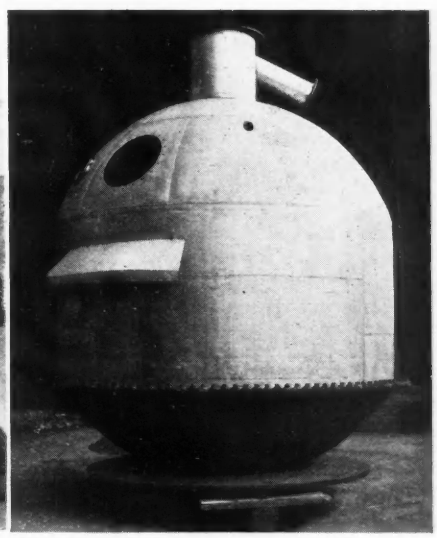
Orders for Outsize Vessels

THE chief feature of the activities of John Thompson (Dudley), Ltd., during the past twelve months has been a large number of repeat orders and further large orders for materials still in the " pioneer " stage. Under the first category may be mentioned a third repeat order for vessels 9 ft. 2 in. diameter × 11 ft. high, conical bottomed, the total for these vessels to date thus numbering 126. On the pioneering side, some three years ago they made the largest monel metal vessel ever made in this country, the vessel being 9 ft. 7 in. diameter; several other vessels in monel metal and stainless steel were ordered from the same source. They now have on hand a duplication of this order, except that one vessel only is in stainless steel and the remainder in Inconel, making the largest order for Inconel plates ever placed in this country. The 9 ft. 7 in. vessel is also the largest Inconel vessel ever ordered in this country.

The homogeneous lead lining department of John Thompson (Dudley), Ltd., has also been exceptionally busy and has put through, amongst others, an order for a large oil company abroad, the order constituting one mild steel shell (not lead lined) and four other shells homogeneously lead lined. These vessels are 10 ft. inside diameter × 40 ft. long, homogeneously lead lined throughout, and with a division plate dividing same into two compartments, this plate being homogeneously lead coated on both sides. The vessels are also fitted with an agitator driven by a vertical spindle motor. The lead lined vessels, when completed, weigh approximately 38 tons each. These are the largest homogeneously lead covered vessels ever made in this country or possibly in the world, and had to be transported from works to docks by a 100-ton tractor and lifted aboard ship by special arrangements with a floating crane.



Lead coated agitators for homogeneously lead lined vessels. The vessels are 10ft. inside diameter and 40ft. long.



The largest Monel metal pan yet made in this country, 9ft. 7in. in diameter. A duplicate in Inconel is now in hand.

Chemical Notes from Foreign Sources

Greece

AN INCREASED DEMAND FOR ROSIN, especially from Italy, has been noted, and prices have risen sharply in consequence.

Czechoslovakia

PURE ALPHA-CELLULOSE FOR THE GAS MASK INDUSTRIES is to be manufactured by several concerns in the cellulose industry including Rosenberg, Sillein, Slavosovce and Harmanec.

Holland

EXPERIMENTS ON THE PRODUCTION OF SOAP from paraffin wax are being carried out by the N. V. Batuafsche Petroleum My., the process employed being based upon cracking of the wax and conversion of the resulting unsaturated compounds into sulphonic acids.

Norway

THE SUITABILITY OF SULPHITE ALCOHOL (a by-product of cellulose manufacture) as a motor spirit is to be examined by a government commission. Five cellulose factories are already equipped for its production.

Germany

CRUDE OIL PRODUCTION from wells owned by the Wintershall A.G. increased from 38,200 tons in 1934 to 84,600 tons in 1935.

THE TOXIC ACTION OF PYRIDINE has been investigated by F. Holtzmann ("Zentralbl. Gewerbehyg," 1936, No. 1), who points out that previous accidents have been attributed to impurities in the shape of picoline and lutidine. Toxic effects have now been observed, however, in the case of a worker who handled pure pyridine over a period of two years in the laboratory. The symptoms were irritation, lassitude, stomach pains, vomiting and neuritis. The case indicates that pyridine is particularly liable to affect the digestive system.

Belgium

AN IRON-TANTALUM-NOBIUM ALLOY is to be produced by the Geomines Tin Mining Co. This company does its own smelting and can make the alloy in its electro-furnaces. The Belgian iron industry will provide a market for the alloy.

NEW MARKETS FOR BONE PHOSPHATE are being sought by the Belgian gelatine industry whose annual production is in the vicinity of 18,000 tons. To a small extent it is being used as cattle food.

A NEW PAINT MANUFACTURING CONCERN, Soc. des Laques et Vernis de Belgique, has been formed at Machelen-lez-Vilvorde with a capital of 1½ million francs.

France

A RUBBER INDUSTRY RESEARCH INSTITUTE has been established in Paris by the leading firms in the industry, under the name of Union professionelle du Caoutchouc.

PERMISSION TO CONSTRUCT A FACTORY for carbon bisulphide and other sulphur compounds has been granted to the Compagnie Industrielle et Commerciale of Bouchain.

RECENT COMPANY FORMATIONS include:—Soc. des Laboratoires Lavoisier at Marseilles (manufacture of cosmetic and pharmaceutical products); Droguerie centrale de la Loire, C. Pichou at St. Etienne with a capital of 400,000 francs (chemical merchants); Soc. des Laboratoires Yté, 34 rue Pigalle, Paris (capital 350,000 francs), manufacture and sale of chemical products, laboratory equipment and veterinary vaccines known by the brand name of "Yté-Vaccins"; Soc. des produits ignifuges et réfractaires, 189 rue du Vieux-Pont-de-Sèvres, Boulogne-Billancourt, Seine (capital 50,000 francs), to produce and deal in all lacquers, paints and varnishes, more especially those with fire-resisting properties.

Dutch East Indies

A SODA FACTORY TO PRODUCE 6,000 TONS ANNUALLY is to be built near Sovra Baya.

Bulgaria

TENDERS FOR 2,000 TONS OF COPPER SULPHATE are invited by the Bulgarian Agricultural Co-operation Bank, in Sofia. Tenders must be lodged before January 12, accompanied by a deposit of 5 per cent. of the value.

Norway

WITH THE OBJECT OF EXPLOITING MOLYBDENUM DEPOSITS at Lier, Royken, Hurum and Strommen, the Ugelstad Molybdengruber A.S. has been formed at Drammen, with a capital of 100,000 kronen. Preliminary work will commence in February, 1937, and the commencing annual output capacity will be about 120 tons of molybdenite.

Hungary

CASTOR OIL PRODUCTION will be undertaken by the chemical works of Gerö and Dr. Ofner, at Ujpest, who have arranged with growers to take over the crop from about 1,000 hectares.

FOODS IN POWDER FORM CONTAINING VITAMIN D are now manufactured in Budapest by the Biochemical Laboratory, Dr. Román and Dr. Laszlo.

Jugoslavia

THE COPPER SULPHATE INDUSTRY has recently made considerable progress and is now able to satisfy the home demand, whereas 4,000 tons were imported in 1930.

CONSTRUCTION OF AN OLEUM AND SULPHURIC ACID WORKS with a daily capacity of 25 tons monohydrate is planned by the Military-Technical Institute, at Obilicevo-Krusevac, which is open to receive tenders up to February 18, 1937. Further details can be obtained from the Trade and Industry Chamber, Agram.

Poland

A SERIES OF LABORATORY REAGENTS is now being made by the Lemberg firm of Adolph Pfützner and Sons, under the brand name of "Normalfix."

A LICENCE FOR THE PRODUCTION OF CASEIN ARTIFICIAL WOOL (lanital) in Poland, has been granted by the Snia Viscosa to a Lodz textile group for the sum of 2 million zloty. Difficulties, however, have developed in connection with casein supplies, as the request of agricultural interests for participation in the new enterprise has been rejected.

A RUBBER-REGENERATING PLANT will shortly be installed by the Sanok Co., of Sanok.

Russia

IN A NEW METHOD FOR MAKING BETAINE, molasses are first extracted with liquid sulphur dioxide, the extract concentrated and the residue of crude betaine purified by successive treatment with acid and alkali (Russian Pat. 40,984).

CRYSTALLINE META-PHENYLENE DIAMINE can be prepared by distilling its zinc chloride double salt with a carbonate of an alkaline earth when the base distils over (Russian Pat. 106,007).

MAGNESIUM PRODUCTION AT THE SOLIKAMSK WORKS has been expanded and 15 furnaces for the production of metallic magnesium are now in operation.

UREA IS NOW BEING PRODUCED at the Stalinogorsk Chemical Combinate, where ammonia is treated in an experimental plant at a pressure of 170 atmospheres at a temperature of 160° C.

PLANT FOR UNDERGROUND GASIFICATION OF COAL has been installed near Schachty in the Donez Basin, the gas being used for steam raising at the Artemgres Power Station.

From Week to Week

THE RETURNS OF VENEZUELAN OIL CONCESSIONS shows only a negligible output for the week to December 26, 1936. The strike of oil workers continues, and the general situation is unchanged.

CHEMICALS FOR THE TINNING AND DYEING INDUSTRIES of Canada are to be produced by the Rohm and Haas Co., of Philadelphia, which has founded a subsidiary in Toronto for that purpose.

SLIGHT DAMAGE WAS CAUSED by a fire in a building in the chemist's department at Woolwich Arsenal, on December 28. It is understood that some acid came into contact with calcium silicite in a refuse receptacle which burst into flames.

A PLEASANT EVENING was spent at the works of British Glues and Chemicals, Ltd., Newark, on December 14, when a new works club room was opened by the manager, Mr. E. J. Gardiner. During the evening it was announced that the company had decided to pay all employees for public holidays, and to allow employees, who have completed one year's service on May 1, one week's holiday with pay.

A COD LIVER OIL REFINERY established at Hull only eighteen months ago has already built up a turnover in excess of the total production of Norwegian cod liver oil. This enterprise on the part of the Hull fishing industry is a striking example of co-operative effort. Not only has a new factory been installed, but the whole of the fishing fleet has been re-equipped to produce the crude fish oil at sea in order to ensure a steady flow of the raw material in its best condition to the refinery.

THE DISPUTE BETWEEN EMPLOYEES AND MANAGEMENT at the works of Bitmac, Ltd., tar distillers, Scunthorpe, is likely to be amicably settled this week. Acting for the men, the local branch of the General and Municipal Workers' Union applied for an extra rate of pay for overtime periods, which this firm, according to the Union secretary, Mr. J. W. Hazel, had not previously paid. A first application from the Union was refused, and then a second application was made, intimating that the men would take decisive action if no satisfaction was forthcoming. Mr. F. W. Bedford, a local director, said he had been touch with his co-directors, and it had been agreed to pay an overtime rate as and from January 1.

OVER 150 PROMINENT ESTABLISHMENTS will exhibit chemicals, drugs and cosmetics at the Leipzig Spring Fair, which is to be opened on February 28. The largest contingent will be furnished by the soap and perfume industry whose display will be specially adapted to suit the requirements of various markets in the world. Another group will comprise exhibitors of drugs and pharmaceutical articles. Natural medicines will be exhibited in a large variety besides all kinds of prophylactics and preventives. The foremost manufacturers of the wax and paraffinware industry will be present as will be those engaged in the production of polishes and cleansing and washing agents.

THE ABERDEEN UNIVERSITY CHEMISTRY CLASS of 1929-31 held its third reunion at the Imperial Hotel on December 25, when Dr. Clow presided.

UNBLEACHED SULPHATE CELLULOSE is to be produced by the British Columbia Pulp and Paper Mills at a new plant to be erected at Woodfibre, British Columbia.

THE NOMINAL CAPITAL of Gerard Brothers, Ltd., soap manufacturers, Wilkinson Street, Nottingham, has been increased by the addition of £40,000 beyond the registered capital of £60,000. The additional capital is divided into 25,000 ordinary and 15,000 5 per cent. cumulative preference shares of £1.

A REFLECTION of Italy's desire to renew trading relations with Britain is shown by the large number of Italian firms and individual buyers who have notified their intention to visit the British Industries Fair next month. Trade buyers are coming not only from the great cities, like Rome, Florence and Milan, but from widely scattered industrial areas in Italy, and from Palermo and Catania in Sicily.

THE LOSS OF GREASE IN SEWAGE WATER in Germany is estimated to be 80,000,000 kg. annually. From this amount 25 to 30 million kg. can be recovered for industrial uses. As an evidence of practicability of grease recovery from waste water a special establishment in the Rhine province has been operating a grease recovery plant for 25 years and has produced within this time 17,000,000 kg. of reclaimed grease which has been turned over to German industry. This establishment has franchises in a number of towns the most important of which is Cologne accounting for 12,000,000 kg. out of the above total. The company installs "grease traps" in the drain pipes where fats and greases are separated by settling and scooped off from time to time. This material is conveyed to a central purification plant where it is refined sufficiently to be of value in the manufacture of soap.

AT THE STRATFORD POLICE COURT on Wednesday, Hankinsons, Ltd., druggists, of Ilford Lane, Ilford, were summoned at the instance of the Pharmaceutical Society for having unlawfully used in connection with their business at Ilford Lane, Ilford, and at South Park Parade, Seven Kings, the description "pharmacist." Mr. E. C. Castle, solicitor for the society, said the offences complained of were that the defendant company sold bottles of cough and neuralgia mixtures to which were affixed labels of "Hankinsons Cash Pharmacists." That was contrary to section 3 (2) of the Pharmacy and Poisons Act, 1933. At other of their premises the words had been crossed out on the labels. The use of such labels, said Mr. Castle, was likely to mislead the public to the belief that the company were qualified chemists. Mr. W. Daybell, for the defence, said until the summonses were issued the defendant company understood that they had a period of grace until January 1, 1937, to discontinue the use of the word and withdraw the labels. Fresh ones had already been ordered. The Bench imposed a fine of £10 on each of the two summonses.

New Companies Registered

The Manchester Oil Refinery, Ltd.—Registered December 5. Nominal capital £250,000. Manufacturers, producers, refiners, distillers, suppliers, distributors, importers and exporters of and dealers in petroleum, petroleum products, oils, lubricants, greases, tallow, petrol, paraffin, benzol, motor spirits, tar, bitumen, wax, beeswax, oil and other fuels, etc. Directors: John H. F. Cohen, 20 Copthall Avenue, E.C.2; J. S. Ebben, L. H. Watts, Major Church, G. Tugendhat and Dr. F. Kind.

Vibrated Flotation, Ltd., Friars House, 39/41 New Broad Street, E.C.2—Registered December 4. Nominal capital £10,500. To adopt an agreement with T. J. Taplin and to carry on the business of manufacturers of and dealers in froth flotation concentration processes and other processes for the separation of minerals, metals and other substances, mechanical and electrical engineers, etc. Directors: Raymond C. Robinson and J. Taplin.

A.M.M.C., Ltd.—Registered December 9. Nominal capital, £80,000. To acquire, produce, fabricate and deal in magnesium in all its forms (including compounds and alloys) and all metals, minerals or substances of any description in connection therewith, and to carry on the business of chemical manufacturers, and merchants, mining engineers, metallurgical engineers and metallurgical chemists, etc. Subscribers: E. T. Horne, 31 Old Jewry, E.C.2, and H. G. E. Cox.

Price's Lubricants, Ltd.—Registered December 28. Nominal capital £10,000. Producers, refiners, storers, transporters, suppliers and distributors of petroleum and other oils, lubricants and lubricating articles and substances, whether products of petroleum or not, shipowners, lightermen, barge owners, etc. Subscribers: E. A. Wolstencroft, 20, Beech Hall Road, T.4., and W. Clarke.

The Saturn Oxygen Co., Ltd., 62 London Wall, E.C.2.—Registered December 11. Nominal capital £200,000. To adopt an agreement dated August 3, 1936, and made between the Commercial Gas Improvement Co., of the first part, Gas Industries Co., of the second part, and Sidney Allen of the third part, and to carry on the business of manufacturers of gases for commercial, industrial, chemical, medical and other purposes and machinery and apparatus for their production, storage and use, etc. Directors: Sidney Allen, T. J. C. Gifford, D. Mackinnon, A. L. Rawlings, D. A. Stewart, and G. E. Aeron-Thomas.

Knights Oil and Chemical Co., Ltd., 77 Lancaster Street, Birmingham.—Registered December 9. Nominal capital, £3,500. To acquire the business of a wholesale drysalter and oil and colour merchant now carried on by John E. Cox at 77, 78 and 87 Lancaster Street, Birmingham, as "Knight and Co." Directors: John E. Cox, and A. S. Cox.

Scottish Fumigators (Cimex), Ltd., 75 Bothwell Street, Glasgow, C.2.—Registered December 11. Nominal capital £100. To acquire the business of Warden and Bell, carried on at 75 Bothwell Street, Glasgow, C.2, as agents for Cimex, Ltd., and to carry on the business of producers, manufacturers, exporters and importers of, agents for and wholesale and retail dealers in Cimex. Directors: Arthur Warden, and T. R. Warden.

London Testing Laboratory, Ltd., 81, Cannon Street, E.C.4.—Registered December 23. Nominal capital £2,500. Proprietors of chemical and physical testing laboratories, analytical and metallurgical chemists, inspecting and testing engineers of iron, steel, non-ferrous metals and structural materials, etc. Directors: Wm. D. Palmer and Wm. Palmer.

Inventions in the Chemical Industry

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Open to Public Inspection

HYDROCARBON OIL LUBRICATING-COMPOSITIONS.—Standard Oil Development Co. June 6, 1935. 3941/36.

OPERATION OF CATALYTIC CONVERTERS.—Houdry Process Corporation. June 4, 1935. 7686/36.

MANUFACTURE OF AZO DYESTUFFS.—I. G. Farbenindustrie. June 6, 1935. 12571/36.

PROCESS FOR THE PRODUCTION OF PROTECTIVE LAYERS ON MAGNESIUM and its alloys.—Siemens and Halske, A.-G. June 1, 1935. 12622/36.

PROCESS FOR THE MANUFACTURE OF LAEVO-ASCORBIC ACID.—F. Hoffman-La Roche and Co., A.-G. June 6, 1935. 14404/36.

PROCESS FOR THE MANUFACTURE OF LUBRICANTS and insulating-oils. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. June 1, 1935. 14781/36.

PROCESS FOR THE MANUFACTURE OF HIGHLY DISPERSED PIGMENTS. I. G. Farbenindustrie. June 1, 1935. 15005/36.

PLANT FOR THE CONCENTRATION OF SALT WATER.—P. A. Barreau. June 6, 1935. 15197/36.

FILMS AND FOILS OF CELLULOSE or cellulose derivatives.—Celluloid Corporation. June 7, 1935. 15210/36.

PROCESS FOR TREATING MINERAL OIL PRODUCTS.—Aktiebolaget Separator-Nobel. June 5, 1935. 15384/36.

FELTING AND FULLING OF TEXTILE MATERIALS.—I. G. Farbenindustrie. June 1, 1935. 15391/36.

SOUP CONCENTRATE and method of manufacture.—A. Verhaeghe. June 1, 1935. 15406/36.

PROCESS AND DEVICE FOR PRECIPITATING FROM A GASEOUS MEDIUM, oil or other substances suspended in mist-like manner.—F. G. Till. June 3, 1935. 15479/36.

TREATMENT OF POLYVINYL ALCOHOLS or their partial derivatives. Chemische Forschungsges. June 5, 1935. 15650/36.

TREATMENT OF POLYVINYL ALCOHOLS or their partial derivatives. Chemische Forschungsges. June 5, 1935. 15751/36.

PROCESS FOR THE MANUFACTURE OF VAT DYESTUFFS.—I. G. Farbenindustrie. June 7, 1935. 15849/36.

DYESTUFFS and process of making.—N. V. Gevaert Photo Producten. June 6, 1935. 15969/36.

MANUFACTURE AND APPLICATION OF NEW SULPHONIUM COMPOUNDS. I. G. Farbenindustrie. June 6, 1935. 16017/36.

PLANT FOR TREATING SALT WATER.—P. A. Barreau. June 6, 1935. 27615/36.

PROCESS FOR THE MANUFACTURE OF CARBAMIDE and formaldehyde products in presence of sulphonated amide derivatives, and products obtained.—L. Segond, and P. Michaut. June 8, 1935. 11526/36.

PROCESS FOR THE MANUFACTURE OF NITRO-CELLULOSE.—Zellstofffabrik Waldhof, and A. Noll. June 11, 1935. 12885/36.

MANUFACTURE OF THIAZOLIDINE DERIVATIVES.—I. G. Farbenindustrie. June 8, 1935. 15970/36.

MANUFACTURE OF ARTIFICIAL THREADS.—I. G. Farbenindustrie. June 8, 1935. 15972/36.

PROCESS FOR THE MANUFACTURE OF RESINOUS CONDENSATION PRODUCTS.—Beck, Koller and Co. (England), Ltd. June 8, 1935. 16042/36.

Specifications Accepted with Date of Application

PROCESS AND APPARATUS FOR TREATING FINELY GRANULATED COLLOIDAL or plastic materials.—A. Carpmael (I. G. Farbenindustrie). June 12, 1935. 458,071.

HYDROXY SULPHONATED FATTY-ACID ESTERS and their production. F. B. Dehn (Procter and Gamble Co.). March 4, 1935. 457,873.

CHEMICAL PROCESS and product.—S. M. Burton. March 5, 1935. 457,923.

SIMULTANEOUS COKING OF HYDROCARBONS, and of mixtures of the resulting distillates with coal.—H. A. Brassert and Co., Ltd., and A. Fisher. March 5, 1935. 457,971.

MEANS FOR HANDLING SOAP PASTE, grease, and other materials of like consistency.—F. G. Harris. March 7, 1935. 457,875.

RECOVERY OFSULPHUR from sulphurous gases.—National Smelting Co., Ltd., S. Robson, and M. W. Travers. March 11, 1935. 458,073.

MANUFACTURE OF ACETYLENE.—British Celanese, Ltd., H. Dreyfus, and W. H. Groombridge. June 11, 1935. 458,160.

INSECTICIDES.—Industrias Quimicas Argentinas Duperial Soc. Anon., and E. Garsoglio. May 7, 1935. 458,024.

REFINING OF CARBON-CONTAINING ALLOYS and metals.—I. Rennerfelt. May 9, 1934. 458,025.

MANUFACTURE AND PRODUCTION OF WATER-SOLUBLE CONDENSATION PRODUCTS having tanning action.—Coutts and Co., and F. Johnson (Legal representatives of J. Y. Johnson (deceased)). (I. G. Farbenindustrie). June 5, 1935. 458,028.

PROCESS FOR THE MANUFACTURE OF QUATERNARY AMMONIUM COMPOUNDS.—A. Carpmael, and I. G. Farbenindustrie. June 8, 1935. 458,033.

REACTION OF OXIDES OF CARBON with hydrogen.—Coutts and Co., and F. Johnson (Legal representatives of J. Y. Johnson (deceased)). (I. G. Farbenindustrie). June 11, 1935. 458,035.

PRODUCTION OF ANTIOXIDANTS and the treatment of rubber therewith.—Rubber Service Laboratories Co. June 28, 1934. 458,094.

MANUFACTURE AND PRODUCTION OF VAT DYESTUFFS of the anthraquinone series.—Coutts and Co., and F. Johnson (Legal representatives of J. Y. Johnson (deceased)). (I. G. Farbenindustrie.) June 12, 1935. 458,099.

MANUFACTURE AND PRODUCTION OF CHLORBUTACIENE.—Coutts and Co., and F. Johnson (Legal representatives of J. Y. Johnson (deceased)). (I. G. Farbenindustrie). June 12, 1935. 458,100.

MANUFACTURE OF OXYARYL-AMINO-ANTHRACENE DERIVATIVES.—I. G. Farbenindustrie. June 23, 1934. 458,102.

LUBRICATING-OILS.—E. I. du Pont de Nemours and Co. June 15, 1934. 458,105.

PROCESS FOR THE MANUFACTURE OF VAT DYESTUFFS of the anthraquinone series.—A. Carpmael (I. G. Farbenindustrie). June 13, 1935. 458,166.

APPARATUS FOR HIGH-VACUUM DISTILLATION.—B. E. A. Vigers, J. L. McCowan, and Imperial Chemical Industries, Ltd. June 14, 1935. 458,117.

Applications for Patents

(November 26 to December 2 inclusive)

MANUFACTURE OF MONOAZO-DYESTUFFS.—I. G. Farbenindustrie. (Germany, Dec. 2, '35.) 32660.

TREATMENT OF ARTIFICIAL-SILK FABRICS.—I. G. Farbenindustrie. (Germany, Dec. 19, '35.) 32921.

OXIDATION OF ORGANIC SULPHIDES.—Imperial Chemical Industries, Ltd. 32586.

MONOAZO DYESTUFFS.—Imperial Chemical Industries, Ltd., and A. H. Knight. 32850.

LUBRICATING OILS.—G. W. Johnson (I. G. Farbenindustrie). 32420.

MANUFACTURE OF BUTADIENE.—G. W. Johnson (I. G. Farbenindustrie). 32765.

HYDROCARBON MIXTURES.—G. W. Johnson (I. G. Farbenindustrie). 32766.

MANUFACTURE OF DERIVATIVES OF PYRENE.—G. W. Johnson (I. G. Farbenindustrie). 32767.

MANUFACTURE OF WATER-SOLUBLE CELLULOSE ETHERS.—Kalle and Co., A.-G. (Germany, Dec. 19, '35.) 33075.

MONOAZO DYESTUFFS.—A. H. Knight. 32850.

HYDROGENATION OF KETONES.—H. Lund. 32987.

PREPARATION OF THERAPEUTICALLY ACTIVE DIAMINES.—May and Baker, Ltd., G. Newbery, and A. S. Ewing. 33108.

ALKYLATION OF CYCLIC HYDROCARBON COMPOUNDS.—A. L. Mond (Universal Oil Products Co.). (Oct. 17, '35.) 32449.

CATALYTIC REFINING OF HYDROCARBON DISTILLATES.—A. L. Mond (Universal Oil Products Co.). (Oct. 17, '35.) 32450.

PRODUCTION OF VALUABLE HYDROCARBONS by selective polymerisation of olefinic hydrocarbons.—A. L. Mond (Universal Oil Products Co.). (Oct. 17, '35.) 32447.

PROCESS FOR EFFECTING CHEMICAL REACTIONS of olefinic hydrocarbons.—A. L. Mond (Universal Oil Products Co.). (Oct. 17, '35.) 32448.

MANUFACTURE, ETC., OF LIQUID PRODUCTS from liquid, etc., distillable carbonaceous materials.—H. E. Potts (International Hydrogenation Patents Co., Ltd.). 32480.

TREATMENT OF RESINS.—R. F. Powell. 32840.

DETECTION OF GASES, ETC., IN AIR.—Ruhl (1922), Ltd., O., and L. A. Sharland. 32760.

MANUFACTURE OF SMOKELESS FUEL.—Soc. Anon. de Carbonisation et de Distillation des Combustibles. (France, Dec. 21, '35.) 32883.

MANUFACTURE OF OXYBENZOFLUORENONES.—Soc. of Chemical Industry in Basle. (Switzerland, Nov. 26, '35.) 32407.

MANUFACTURE OF OXYBENZOFLUORENONES.—Soc. of Chemical Industry in Basle. (Switzerland, Nov. 24.) 32408.

MANUFACTURE OF OXY-SULPHONIC ACIDS of hydrocarbons of high molecular weight.—Soc. of Chemical Industry in Basle. (Switzerland, Dec. 31, '35.) 32529.

MANUFACTURE OF INSOLUBLE AZO-DYESTUFFS ON FIBRE.—Soc. of Chemical Industry in Basle.) (Switzerland, May 30.) 32639.

TEXTILE PRINTING.—Soc. of Chemical Industry in Basle. (Switzerland, Dec. 2, '35.) 32750.

TEXTILE PRINTING.—Soc. of Chemical Industry in Basle. (Switzerland, Nov. 30.) (Cognate with 32750.) 32751.

PRINTING TEXTILE MATERIALS.—Soc. of Chemical Industry in Basle. (Switzerland, Dec. 2, '35.) 32919.

PRINTING TEXTILE MATERIALS.—Soc. of Chemical Industry in Basle. (Switzerland, Nov. 30.) (Cognate with 32919.) 32920.

TREATMENT OF FATTY OILS.—Super-Centrifugal Engineers, Ltd., and F. W. Pecher. 32771.

OXIDATION OF ORGANIC SULPHIDES.—H. W. Thompson. 32586.

Weekly Prices of British Chemical Products

MARKET conditions have been quiet during the week. The price for refined glycerine has been advanced a further £10 per ton. With the exception of the items mentioned below the prices of chemical products remain as reported in THE CHEMICAL AGE of December 19 (pp. 534-535). Unless otherwise stated the prices below cover fair quantities net and naked at sellers' works.

MANCHESTER.—Trading on the Manchester chemical market this week was resumed on a quiet scale and the attendance on the Royal Exchange was obviously still to some extent under the influence of the holidays. Here and there sellers have reported additional contract bookings in the leading heavy materials, and altogether forward commitments over next year have not been unsatisfactory. Allowing for the fact that in a number of instances the resumption of deliveries has been held up by stock-taking operations, the movement of chemicals into consumption in this area during the last few days has been on a fair scale, and with an improving tendency still in evidence in the textile trade general prospects are regarded as reasonably bright. Taking the market as a whole prices continue on a steady basis and in one or two cases the trend is to higher levels.

GLASGOW.—Business in general chemicals for home trade has been rather quiet during the week, on account of the holidays, but a fair trade is being done for delivery in the early part of the year. Prices generally continue very firm, several articles again being slightly dearer, and red lead and litharge have been increased further £2 per ton on account of the continued advance in the price of the metal. Trading in coal tar products has been somewhat limited. Main activity on the manufacturing side has been directed toward the completion of contracts terminating with the close of the year. Some business has been done in dark 97/99 cresylic acid at 2s. 6d. per gal., and the American grade has been booked for forward delivery at from 2s. 9d. to 3s. 3d. per gal. according to purity and colour. Fairly large volumes of motor benzol are changing hands, but crude appears to be somewhat stationary. Other products, with the exception of pitch, are in fairly steady demand.

General Chemicals

ACID, CRESYLIC.—97/99%, 3s. 2d. to 3s. 3d. per gal.; pale, 98%, 3s. 1d. to 3s. 2d.; dark, 2s. 6d. to 2s. 7d.; 99/100%, refined, 3s. 7d. to 3s. 9d. per gal. MANCHESTER: 99/100%, pale, 3s. 6d.

ACID, OXALIC.—£48 15s. to £57 10s. per ton, according to packages and position. SCOTLAND: £2 9s. per cwt. in casks. MANCHESTER: £49 to £55 per ton ex store.

ACID, TARTARIC.—1s. per lb. less 5=, carriage paid for lots of 5 cwt. and upwards. SCOTLAND: 11½d. less 5%. MANCHESTER: 1s. per lb.

CREAM OF TARTAR.—£3 19s. per cwt. less 2½%. LONDON: £3 17s. per cwt. SCOTLAND: £3 19s. net.

GLYCERINE.—Chemically pure, double distilled, 1,260 s.g., in tins, £4 2s. 6d. to £5 2s. 6d. per cwt. according to quantity; in drums, £3 15s. to £4 8s. 6d.

LEAD ACETATE.—LONDON: White, £33 15s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £34 to £35; brown, £1 per ton less. MANCHESTER: White, £36, brown, £34 10s.

LEAD, RED.—SCOTLAND: £40 per ton less 2½%, carriage paid, for 2-ton lots.

POTASSIUM BICHROMATE.—SCOTLAND: 5d. per lb., less 5%, carriage paid.

POTASSIUM PERMANGANATE.—LONDON: 8¼d. per lb. SCOTLAND: B.P. Crystals, 9¼d. MANCHESTER: B.P. 10½d. to 11½d.

POTASSIUM PRUSSATE.—LONDON: Yellow, 7½d. to 8d. per lb. SCOTLAND: 7d. net, in casks, ex store. MANCHESTER: Yellow, 6½d.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels. SCOTLAND: Large crystals, in casks, £37 10s.

SODIUM ACETATE.—LONDON: £21 per ton. SCOTLAND: £18 10s. per ton net ex store.

SULPHATE OF AMMONIA.—Neutral quality, basis 20.6 per cent. LAND: £19 per ton less 5%.

Latest Oil Prices

LONDON, Dec. 30.—LINSEED OIL was steady. Spot, £30 10s. per ton (small quantities); Jan. and Jan.-April, £28; May-Aug., £28 10s.; Sept.-Dec., £28 15s., naked. SOYA BEAN OIL was steady. Oriental (bulk) spot, ex tank Rotterdam, £33 per ton. RAPE OIL was steady. Crude extracted, £35 10s. per ton; technical, refined, £36 10s., naked, ex wharf. COTTON OIL was firm. Egyptian, crude, £31 10s. per ton; refined common edible, £35; deodorised, £37, naked, ex mill (small lots, £1 10s. extra). TURPENTINE was steady. American, spot, 43s. 9d. per cwt.

HULL.—LINSEED OIL, spot, quoted £28 10s. per ton; Dec. and Jan.-April, £28 2s. 6d.; May-Aug., £28 7s. 6d.; Sept.-Dec., £28 12s. 6d. COTTON OIL.—Egyptian crude, spot, £31 10s. per ton; edible, refined, spot, £34; technical, spot, £34; deodorised, £36, naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £37 per ton, naked. GROUNDNUT OIL, extracted, spot, £35 10s. per ton; deodorised, £38 10s.; RAPE OIL, extracted, spot, £34 10s. per ton; refined, £35 10s. SOYA OIL, extracted, spot, £34 10s. per ton; deodorised, £36 10s. COD OIL, f.o.r. or f.a.s., 27s. per cwt. in barrels. CASTOR OIL.—Pharmaceutical, 45s. per cwt.; first, 40s.; second, 38s. TURPENTINE.—American spot, 45s. per cwt.

Coal Tar Products

ACID, CRESYLIC.—97/99%, 3s. 2d. to 3s. 3d. per gal.; 99/100%, 3s. 6d. to 4s. per gal., according to specification; pale 99%, 3s. 4d. to 3s. 5d.; dark, 2s. 9d. to 2s. 10d. GLASGOW: Pale, 99/100%, 3s. to 3s. 6d. per gal.; pale, 97/99%, 2s. 6d. to 2s. 9d.; dark, 97/99%, 2s. 5d. to 2s. 8d.; high boiling acids, 1s. 8d. to 2s.; American specification, 2s. 9d. to 3s. 3d.

Chemical and Allied Stocks and Shares

THE industrial section of the Stock Exchange has been rather inactive this week, but a firm undertone was maintained owing to the general belief that trade recovery will make further progress in 1937. Imperial Chemical were active around 41s. 9d., Distillers at 124s. 6d. continued to attract a good deal of attention, largely owing to persistent talk in the market of a possible bonus later in the year. The market is still, however, taking the view that no change will probably be shown in the forthcoming interim dividend. Triplex Safety Glass was another share which continued to receive attention on bonus expectations, as did Associated Portland Cement and British Insulated Cables.

There was increasing demand reported for Amalgamated Metal and Metal Traders on the great activity in the metal markets, and Imperial Smelting were bought on the view that if there is no marked set-back in the price of zinc, prospects of dividends being resumed this year appear to be good. Dunlop Rubber were rather neglected, largely owing to uncertainty as to how the company's results will be affected by the large rise in the price of rubber. Turner and Newall were bought on the deal whereby the Quaisi-Arc subsidiary is exchanged for ordinary stock in the British Oxygen Co. According to views current in the market this week the market value of the latter received by Turner and Newall is probably in the neighbourhood of £1,000,000. British Aluminium were higher at 44s. 3d. on the belief that the higher price of tin may lead to increased demand for aluminium in some directions. Most paint shares were steady, but Pinchin Johnson were rather higher at 53s. 6d. on hopes of either a larger dividend or a bonus. General Refractories were firmer around 30s. 9d., and the 5s. shares of International Diatomite were higher at 7s. The 4¼ per cent. preference shares of National Fertilisers were steady at 20s. 9d. Salt Union were favoured and have made the higher price of 45s. 3d. in response to growing hopes that the directors may decide on a less conservative policy and that an increase over the 9 per cent. paid for the previous year may therefore be forthcoming.

B. Laporte were rather more active but are lower on balance at 125s. Murex received a good deal of attention at 9¼ on the possibility that yet another bonus may be in prospect. United Molasses were moderately lower but were reported to be active.

There was better demand for British Plaster Board on attention drawn to the varied use of gypsum, but best prices were not held. Borax Consolidated deferred were active and higher at 35s. 7½d. It is generally anticipated that the results of the latter company will show a further good improvement in profits; estimates of the dividend range from 7½ per cent. to 10 per cent. in the market at the present time.

British Glues, British Industrial Plastics, British Drug Houses and William Blythe were all steady but prices were not apparently tested by a great deal of business in all cases. British Tar Products 5s. shares have been in larger demand on attention drawn to the apparently attractive yield offered on the basis of the 15 per cent. distribution which has been forthcoming for some years. Dorman Long were better after a reaction, and other iron, steel and allied shares to attract attention included Millom and Askam, Pease and Partners and Consett Iron. Colvilles were reactionary owing to fears that the directors may pay only a conservative dividend. United Glass Bottle and Canning Town Glass have been steady, aided by market hopes that in each case the dividend may be raised by 1 per cent.

Oil shares were in good demand on talk of higher oil prices later in the year, and "Shell" benefited from hopes that an interim dividend of 5 per cent., tax free, may be declared shortly and that the total for the year may be raised to 22½ per cent.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

COLLCETONE, LTD., London, W., manufacturers of pottery, celluloid, etc. (M., 2/1/37.) December 10, £20,000 and any further advances mortgage, to Halifax Building Society; charged on factory and land at Hurst Green, Oxted; also December 10, debenture, to said society, securing £20,000 under mortgage of even date and all other moneys payable thereunder including further advances; general charge.

Satisfactions

THOMAS TYRER AND CO., LTD., London, E., chemical manufacturers. (M.S., 2/1/37.) Satisfactions December 18, £3,000, part of amount outstanding July 1, 1908, £5,000, registered July 21, 1924, and £3,300, registered May 19, 1936.

County Court Judgments

(NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court Judgments against him.)

TRAVIS, S. H. (male), 11 Rylett Crescent, W., manufacturing chemist. (C.C., 2/1/37.) £13 2s. 11d. November 13.

Companies Winding-up Voluntarily

HYDROCOL, LTD. (C.W.U.V., 2/1/37.) By special resolution, December 15, 1936. Mr. T. F. C. Downman, of Cafferata and Co., Ltd., Newark, Notts, appointed liquidator.

PETROLEUM OIL TRUST, LTD. (C.W.U.V., 2/1/37.) By special resolution December 16, 1936. Mr. Norman Stanley Pain, of 35 New Broad Street, London, E.C., appointed liquidator.

THE PURE BONE PHOSPHATE AND CHEMICAL CO., LTD. (C.W.U.V., 2/1/37.) By special resolution, December 15, 1936. Mr. T. F. C. Downman, of Cafferata and Co., Ltd., Newark, Notts, appointed liquidator

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Australia.—A firm of importers and manufacturers' representatives at Perth desires agencies for drugs, and druggists' sundries, on a commission or consignment basis, for the State of Western Australia. (Ref. No. 576.)

Canada.—A firm of manufacturers of refractories established at Montreal wishes to obtain the representation of United Kingdom manufacturers of refractory materials, including fire-clay brick, silica brick, high temperature cements. (Ref. No. 580.)

Cyprus.—A commission agent established at Nicosia wishes to obtain the representation of United Kingdom manufacturers of pharmaceutical and chemical products. (Ref. No. 582.)

Iraq (Bagdad).—A commission agent desires to be put in contact with supplies of silver nitrate and sulphuric acid (66° Bé). (Ref. No. 593.)

Egypt.—The Commercial Secretary to the Residency, Cairo, reports that the Ministry of Public Health, Cairo, is calling for tenders for the supply and delivery of quantities of medicinal oils for the year 1937-1938. Tenders should be addressed to the Director of Stores, Ministry of Public Health, Cairo, by whom they will be received up to 10 a.m. on February 27, 1937. (Ref. T. 91).

Forthcoming Events

LONDON.

Jan. 4.—Society of Chemical Industry. (London Section and Chemical Engineering Group). "The Zinc Industry." S. Robson. 8 p.m. Burlington House, Piccadilly, London.

Jan. 6.—Society of Glass Technology. Council Meeting. 10 a.m. Ordinary General Meeting. 2 p.m. The Science Museum. Annual Dinner Dance. 7.15 p.m. Trocadero Restaurant, Piccadilly Circus, London.

Jan. 6.—Society of Chemical Industry. (Food Group). Jubilee Memorial Lecture. "The Service of Science to Industry." Dr. J. T. Dunn. 8.30 p.m. London School of Hygiene and Tropical Medicine, London.

Jan 8.—Society of Dyers and Colourists. (London Section). "The Properties of Dyestuffs in Relation to Garment Dyeing." J. G. Grundy. London.

BIRMINGHAM.

Jan. 5.—Electrodepositors' Technical Society and Birmingham Paint, Varnish and Lacquer Club. "Transparent Lacquers." A. F. Brockington. "Pigmented Lacquers." G. Howse. 7.30 p.m. James Watt Memorial Institute, Gt. Charles Street, Birmingham.

Jan. 7.—Institute of Metals. (Birmingham Local Section). "Powder Metallurgy." J. C. Chaston. 7 p.m. James Watt Memorial Institute, Birmingham.

Jan. 7.—Society of Chemical Industry. (Birmingham and Midland Section). "Aluminous Cement as a Basis for Refractories." A. V. Hussey. 7.30 p.m. University Buildings, Edmund Street, Birmingham.

HULL.

Jan. 5.—Hull Chemical and Engineering Society. "Colours and Measurement of Colours." John A. Stokes. 7.45 p.m. Room 57, Municipal Technical College, Park Street, Hull.

LIVERPOOL.

Jan. 8.—Society of Chemical Industry. (Liverpool Section). "Pure Science, its Interpretation, Co-ordination and Application." H. W. Cremer. 6 p.m. Muspratt Lecture Theatre, The University, Liverpool.

MANCHESTER.

Jan. 4.—Institute of the Plastics Industry. (Manchester Section). "Flow Testing Methods for Synthetic Resin Moulding Materials." C. Wainwright. College of Technology, Manchester.

Jan. 7.—Manchester Literary and Philosophical Society. Young People's Meeting. 3.30 p.m. 36, George Street, Manchester.

Jan. 7.—Institute of Vitreous Enamellers. (Northern Section). "Mechanical Drying as Applied to Vitreous Enamelling." J. H. Hollows. 7.30 p.m. Queen's Hotel, Manchester.

Jan. 8.—Chemical Society, Society of Chemical Industry and Society of Dyers and Colourists (Manchester Sections). "Reaction of Diazosulphonates derived from β-Naphthol-l-sulphonic Acid." Professor F. M. Rowe. 7 p.m. Constitutional Club, St. Ann's Street, Manchester.

Jan. 8.—Institute of the Plastics Industry. (Manchester Section). "Plastics." A. R. Dunton. Manchester.

Jan. 9.—Manchester Literary and Philosophical Society. "Chemical Section." Soirée. 7 p.m. 36, George Street, Manchester.

Company News

British Benzol and Coal Distillation.—The directors propose to reduce the capital of the company from £250,000 to £125,000 by writing 4s. 4½d. off each of the 400,000 8 per cent. cumulative participating preferred ordinary 10s. shares and 9d. off the 1,000,000 deferred 1s. shares. The reduced capital will be converted into 125,000 ordinary of £1 each, to be allocated as follows: 9 ordinary for every 32 preferred and 1 ordinary for every 80 deferred now held. After the reduction, the capital will be increased to the present amount of £250,000 by the creation of 125,000 6 per cent. preference shares of £1, which will be offered for subscription as soon as the scheme is sanctioned. The proceeds will be applied in repaying bank and other loans. There was a profit of £18,785 for the year to October 31, 1936, compared with a loss of £4,811 in 1934-35. This reduced the debit balance to £74,119. No dividends have yet been paid on either class of share.

Illingworth Carbonisation.—The report for the year ended August 31, 1936, states that the plant is now in partial operation. Fuel is being produced and marketed, and giving satisfaction. Advice has been received that the plant erected in Italy has now commenced production. The amount expended on development for the year was £2,155; adding debenture interest (gross) £2,550 makes £4,705, less dividend from liquidation of T. and R. W. Bower (Illingworth) Carbonisation Co., £414, salaries accrued now surrendered £430, and transfer fees £4, leaving debit £3,857, add balance brought forward £84,804, making debit on development and research account £88,661.